



COLONY OF MAURITIUS

DEPARTMENT OF AGRICULTURE

Twentieth Annual Report
of the
Sugarcane Research Station
1949

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SUGARCANE RESEARCH STATION, MAURITIUS
20TH ANNUAL REPORT 1949

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Policy of the Station

Since its inception in 1930, the policy of the Sugarcane Research Station has been to improve the yield of sugar per arpent from the sugarcane plantations, and to extend the area capable of being planted in this crop, in order to increase the total sugar output of the Colony. Much progress has already been achieved in this direction, as is evidenced by the fact that the crop for 1949 reached the record figure of 415,000 tons. Efforts are being made to improve yields still further, and the most likely line is by the breeding of specialised varieties of sugarcane for different localities ; especially those in the cool and rainy upland regions. A second method by which it is hoped to increase the total production considerably is to induce the small planters to adopt better cultural and manurial practices based on up-to-date information.

This policy cannot at present be pursued as energetically as could be desired, due to the shortage of senior staff in the Chemical and Botanical Divisions.

26th July, 1950

N. CRAIG,
Ag. Director of Agriculture.

STAFF

<i>Officer-in charge</i>	N. CRAIG, M.Sc. (Durham) up to 10.2.49. A. DE SORNAY, DIP. AGRIC. (MAUR.), I.A.C. (PARIS), B.Sc. (LOND.) acting from 11.2.49.
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CANE BREEDING DIVISION

<i>Plant Breeder</i>	A. DE SORNAY, DIP. AGRIC. (MAUR.), I.A.C. (PARIS), B.Sc. (LOND.).
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<i>Assistant Plant Breeder</i> ...	P. R. HERMELIN, DIP. AGRIC. (MAUR.).
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CHEMICAL DIVISION

<i>Chemist</i>	Vacant.
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<i>Assistant Chemist</i>	S. M. FEILLAFÉ, DIP. AGRIC. (MAUR.), A.C.R. (MAUR.) (acting as Chemist).
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BOTANICAL DIVISION

<i>Botanist</i>	Vacant.
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<i>Assistant Botanist</i>	E. ROCHECOUSTE, DIP. AGRIC. (MAUR.), B.Sc. (LOND.) (acting as Botanist).
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<i>Officer-in-charge of cultural Methods</i>	B. NUNDLOLL.
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EXTENSION SERVICE DIVISION

<i>Senior Field Demonstrator</i> ..	G. MAZERY, DIP. AGRIC. (MAUR.).
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<i>Field Demonstrators</i> ...	J. MAROT. M. SOOLTANGOS, DIP. AGRIC. (MAUR.). G. AVICE. D. REETOO. B. ROY, DIP. AGRIC. (MAUR.). J. B. DE GERSIGNY.
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<i>Clerical Assistant</i> (part-time services only)	E. T. LA GAITÉ.
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RESEARCH ADVISORY COMMITTEE OF THE SUGARCANE RESEARCH STATION FOR THE YEAR 1949

Ex officio :

The Director of Agriculture—*Chairman*
 The Chemist.
 The Botanist.
 The Plant Breeder.

Nominated by His Excellency the Governor :

Hon. D. Luckeenarain.
 Hon. A. M. Osman, O.B.E.

Nominated by the Advisory Board of the Mauritius College of Agriculture :

Mr. G. P. Langlois.
 Mr. Pierre Halais.

Nominated by the Sugar Industry Reserve Fund Committee:

Mr. Pierre de Sornay, Chevalier de la Légion d'Honneur,
 Mr. Adrien Wiehe.

Twentieth Annual Report of the Sugarcane Research Station for 1949

Introduction

The most spectacular feature of the 1949 sugar crop season which has just completed its course, was the peak production of 415,000 metric tons, a substantial increase on the previous record of 391,000 tons in 1948. Such a magnificent result may be ascribed to the following factors—

1. *The high proportion of the cane variety M.134/32, which accounted for over 90 per cent of the total cane area during the year.*

This cane has set up a high standard in both the field and factory and, in having bred it, the Sugarcane Research Station has rendered yeoman service to the Sugar Industry in particular and to the country at large.

Apart from the absence of cyclonic disturbances, the growing season has not been a very favourable one on the whole. Except in February, precipitations were deficient, from the meteorological standpoint, during the grand period of growth. But, despite the water shortage, yields have been generally running high in the field at harvest. It is therefore possible that precipitations may have proved sufficient, due to the inherent capacity of M.134/32 to utilize, to a high degree, the available soil moisture, a factor intimately bound up with its genetical make-up. In the light of the past few years' results, it would appear that the concepts of water-relationships, have to be revised, in order that the relation between crude rainfall incidence and crop production may be more accurately gauged in relation to crop forecasting.

In the light of the above considerations, it is contended that the growth capacity and drought resisting powers of M.134/32 have been factors of the greatest importance in the attainment of such a remarkable production.

2. *Favourable maturation conditions on the whole.*

Maturation conditions were unfavourable up to the month of September, due to the occurrence of copious rains during the first part of the grinding season. There was, fortunately, a decided turn for the better thereafter: low temperatures, coupled with lack of rainfall, brought a rapid improvement, the sucrose content of the cane soaring to high levels. Such favourable conditions persisted until the end of the crop, with the result that the average sugar extraction was very high and just a little short of last year's figure.

The above facts tend to indicate that M.134/32 is capable of taking advantage of late rains, particularly in the north of the island; of responding to a change in the meteorological elements and maturing quickly.

Rainfall figures for three stations, in the dry, intermediate, and high rainfall localities, and temperature data for Réduit, supplied by the Statistician, Department of Agriculture, are given in the following table—

Months	Experimental Station Pamtlemousses Rainfall (inches)		Central Experimental Station Réduit Rainfall (inches)		Temperature Departure from Normal °C	Royal College Curepipe Rainfall (inches)	
	Normal	Registered	Normal	Registered		Normal	Registered
November 1948 ...	2.13	1.86	2.33	1.89	0.0	5.71	6.62
December 1948 ...	4.91	3.27	6.37	3.10	-0.1	9.71	9.27
January 1949 ...	9.56	1.71	10.32	6.62	0.0	16.33	20.65
February ..	8.74	11.35	10.95	14.17	-0.8	17.28	20.81
March ..	9.32	4.49	11.94	4.94	-0.3	19.31	13.68
April ..	5.96	4.55	5.41	4.60	0.0	12.39	19.31
May ..	4.48	0.98	4.24	1.63	+0.2	9.86	7.05
June ..	3.43	4.63	3.11	9.07	+0.7	7.47	19.63
July ..	2.93	1.70	2.75	3.41	-0.3	8.57	10.01
August ..	2.59	1.05	2.47	1.41	-0.4	7.79	3.58
September ..	1.83	0.54	1.71	0.68	-0.3	5.78	3.11
October ..	1.95	0.58	1.91	1.36	-0.4	4.52	3.04
November ..	2.13	2.36	2.33	2.68	-0.5	5.71	8.11
December ..	4.91	1.69	6.37	4.09	-0.4	9.71	4.09
TOTAL ...	64.87	40.76	72.21	59.65	-3.5	140.14	148.96

3. A larger area under cultivation : an increase of approximately 7,000 arpents over 1948.

4. The improvement in cultural methods, including higher fertilizer dressings.

* * *

Following the departure on leave in February 1949, of Mr. N. Craig, Deputy Director of Agriculture and Officer in charge, Sugarcane Research Station, and until his return in December, Mr. A. de Sornay, Plant Breeder, was appointed Acting Officer in charge, Sugarcane Research Station.

Mr. R. Hermelin of the Entomological Division, Department of Agriculture, was appointed Assistant Plant Breeder in December, in replacement of Mr. G. Mazery who has definitely opted for the post of Senior Field Demonstrator. Work in the Division of Genetics, which has been restyled Division of Cane Breeding, could proceed at a high tempo despite the staff shortage and due to the help received from the Extension Service.

Both the Chemistry and Botany Divisions, particularly the former, suffered from inadequate staff throughout the year. Messrs. S. M. Feillafé and E. Rochecouste were appointed Acting Chemist and Acting Botanist respectively, with retroactive effect as from 13th November, 1948.

In view of the urgent need of improving and increasing the work of the Cane Breeding, Chemistry and Botany Divisions, the Advisory Committee of the Sugarcane Research Station has recommended the appointment of three Scientific Assistants, one for each Division, as from the beginning of the 1950-51 financial year ; these posts have been included in the Draft Estimates for 1950-51. The appointment of a clerk on full-time services is under consideration.

The Extension Service was, at the beginning of the year, brought to full strength by the appointment of Messrs. B. Roy, D. Reetoo and J. de Gersigny as Field Demonstrators. It now consists of a Senior Field Demonstrator and six Field Demonstrators. The allocation of the Field Demonstrators to the factory areas of the island is mentioned in Part IV of the Annual Report.

* * *

The Station was visited by several personalities during the year under consideration. Sir Thomas Lloyd, Under-Secretary of State for the Colonies, in company with his private Secretary, Mr. J. O. Morton, were taken round on a rapid but comprehensive tour of the Station, the Department of Agriculture and College of Agriculture.

Dr. G. A. C. Herklots, Secretary to the Colonial Agricultural, Forestry and Animal Research Council, met the Advisory Committee of the Station in February, to discuss the organisation of research in the Colonial Empire. He visited the experimental fields of the Station on the same day as Prof. Dr. J. Koningsberger of the Proefstation Oost Java, who called at Mauritius on his way to Indonesia.

Other visitors to the Station were: Mr. C. G. Eastwood, Assistant Under-Secretary of State for the Colonies, Messrs. R. Coste and R. Payet, Director of Agriculture and President, Chamber of Agriculture of Réunion Island respectively, His Excellency, Sir Hilary Blood, Governor of Mauritius and its Dependencies, and Mr. C. W. S. Hartley, Senior Agricultural Officer, Department of Agriculture, Malaya.

The Director of Agriculture, the Acting Officer in charge, Sugarcane Research Station and several officers of the Department of Agriculture were invited to meet Mr. H. H. Stage, Assistant Chief of the Division of Insects affecting Man and Animals, U.S. Department of Agriculture, at Government House, Le Réduit. The object of the short visit of Mr. Stage to Mauritius was to discuss requests for assistance in supplying technical experts from the United States for vacancies in the United Kingdom which cannot be filled at the present due to the shortage of trained scientists. One problem for solution by one of these experts was submitted to the Director of Agriculture for presentation to Mr. Stage: the assessment of the influence of rainfall on cane and sugar yields in connection with irrigation and crop insurance against drought.

Six meetings of the Sugarcane Research Station Advisory Committee were held during the year ; the first on 11th March, 1949, to discuss the Annual Report of the Station for 1948, and the second on 11th April to discuss the research programme for 1949.

A special meeting was convened in February 1949, to which Dr. G. A. C. Herklots was invited to meet the members of the Committee and the senior officers of the Station and to discuss the organisation of research in the colonies.

Other meetings were called to discuss, *inter alia*, the importation of new cane varieties from South Africa and the U.S.A., and a new method of layout for the second-trials laid down by the Cane Breeding Division. The interest shown by the members in the various problems presented to them, as well as their co-operation, are deeply appreciated.

* * *

A detailed account of the work carried out in the Cane Breeding, Chemistry, Botany and Extension Service Divisions is given in Parts I to IV of the Report.

Out of a total of 224 crosses made at Réduit and Pamplémousses, a large number of seedlings was raised, and approximately 20,000 planted in the field. Larger populations of seedlings could not be planted owing to lack of ground space, the planting distance in the seedling plots having been increased to make selection more trustworthy. The future policy will be to plant about 30,000 seedlings so as to increase the odds of coming across a superior variety.

The breeding policy is denominated by the need for producing heavy yielding varieties of high sucrose content for the high rainfall areas of the island. The problem calls for urgent solution, especially in view of the fact that new lands are being opened up by estates in such ecological areas. If a cane variety could be found adapted to these localities, particularly on the windward side of the island, where climatic conditions are more extreme, a great step forward would be made towards increasing the total sugar production of the Colony. A certain number of variety trials containing new seedling canes, having shown promise in preliminary tests, is therefore being laid down on estates displaying such environmental conditions.

The breeding of the cane, M.134/32, by the Sugarcane Research Station, has increased the Colony's annual revenue by a very substantial margin, but the Station cannot afford to rest on its present laurels. It is imperative that new cane varieties be periodically introduced into the sugar industry, if it is to retain its high standard and stability, especially in view of the present world competition. It is therefore hoped that M.134/32 will prove but a stepping-stone to still better yielders both in the field and factory.

The release of the variety M.423/41, a daughter of M.134/32, is under active consideration. It is an outstanding seedling cane, having produced 15 per cent more sugar per arpent than M.134/32, in 32 tests covering a period of four years and distributed over the entire cane area. It is resistant to diseases and, due to its habit of growth, is likely to prove more resistant to cyclonic winds than M.134/32. It germinates well and has a good canopy, thus reducing weeding costs.

The variety M.213/40, also bred from M.134/32, is a heavier yielder than M.423/41, but the necessity of obtaining more data of its factory qualities warrants the postponement of its release to the end of next crop.

New cane varieties have been imported from South Africa and the U.S.A., while planting material of some of the locally produced seedlings and three of the Barbados varieties introduced from abroad, have been exported by air to several countries.

It is unnecessary to emphasize the importance of the interchange of varieties between cane growing countries. The chief aim is to increase the possibility of breeding better hybrids through the introduction of new blood lines ; but there is also the likelihood of sorting out, as a result of local varietal tests, a superior variety capable of outclassing the varieties already in vogue. In the U.S.A., for example, it is considered that much of the rapid progress in corn improvement is the result of the exchange of materials among plant breeders.

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A prominent feature of the National Gardens Show held in London in July last, was the stand of the Mauritius Chamber of Agriculture arranged by Sir Philippe Raffray, representative of the Chamber. Several exhibits were prepared by the Cane Breeding Division of the Station and sent by air or surface route to England. Apart from the cuttings of M.134/32 and M.63/39 from which stools were grown at Kew Gardens, live cane plants of these two varieties, at various stages of development, were sent in tubs by sea. Unfortunately, the plants had to be placed on the ship's deck in an exposed position, and were destroyed by sea sprays as a result of bad weather being experienced on the way to Durban. For more details concerning the Exhibition, the reader is referred to a short article published in the International Sugar Journal, Vol. LI, 1949, and reproduced by courtesy in the November-December issue of the local agricultural review, from which it can be deduced that the show was a great success.

* * *

The Chemistry Division was partly engaged in foliar diagnosis work. This technique, as already described in previous reports, is an improved and modern agrobiological method of determining the nutrition status of the cane plant from leaf analysis. M.213/40 and M.423/41 have been included in the investigations, in order that their foliar diagnosis may be compared with that of the standard variety M.134/32.

A soil survey of the Crown Forest areas of the Colony has been undertaken by the Division at the request of the Conservator of Forests. The Acting Chemist, who was able to devote a short time to the survey, has arranged for the collection of soil samples and the study of soil profiles from specified areas. The work, which is a sequel to prior investigations conducted on similar lines on the cane lands of Mauritius, is likely to yield valuable information, not only from the silvicultural, but also from the agricultural standpoint, as some of the lands surveyed might prove suitable for the cultivation of food-crops.

Fertilizer, lime and basalt trials have been laid down on estates, and pot experiments carried out to determine which of the elements contained in basalt is acting as a plant food when the basalt is applied to the soil.

* * *

The work of the Botany Division can be summarised as follows—

- (a) Chemical weed control investigations to assess the herbicidal properties of weedicides on weed species hitherto uninvestigated.
- (b) Experiments to evaluate the effects of interplanting food-crops with sugarcane ; such food-crops comprise mainly : maize, potatoes, sweet potato, groundnuts, tomatoes and eddoes. The results of some of these trials have shown that maize planted in virgin cane interlines has a depressing effect on cane yields, reduction in yields being significant.
- (c) Cultural experiments on secondary crops such as : maize, oats, rice, linseed, sweet potato and groundnuts. These experiments comprise fertilizer, variety-and-time-of-planting, and spacing trials and have yielded interesting preliminary data.
- (d) Experiments on the use of organo-mercurial compounds, and other disinfectants, in the pre-treatment of cane setts. The results obtained, up to now, indicate that several brands such as Agrosan, Aretan and Abavit S, were the best in regard to their fungicidal properties and growth promoting action.
- (e) Investigations to test the resistance of M.213/40 and M.423/41, against M.134/32, to *Clemora Smithi* ; these consisted in isolating entire stools, pruning the roots and counting the number of new roots produced from the dormant root primordia, as described in the Acting Botanist's report. Both varieties appeared to be as resistant as M.134/32.

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The Extension Service was brought to full strength at the beginning of the year. There has, accordingly, been a redistribution of the small planters' lands allocated to the Field Demonstrators, depending on factory areas, location of planters' lands, lodging accommodation, etc.

The Field Demonstrators have undergone a complete course of training with the view to improving their scientific background. A series of lectures on sugarcane, in relation to its anatomy and composition, its cultivation, the environment in which it grows, its pests and diseases, has been delivered to them by several officers of the Station and of the Department of Agriculture.

The Service was mainly engaged in field demonstration work on small planters' estates, and in instructing planters on up-to-date methods of cane cultivation.

In view of the very low phosphoric acid content of some of the samples of phosphatic guano collected from small planters by the Field Demonstrators, Government Notice No. 289 of 1949 has been issued by Government specifying the minimum percentage of phosphoric acid in phosphatic fertilizers on sale on the local market.

There is a great task ahead of the Division: increasing small planters' yields and bringing them up to a level more comparable with those obtained by big planters and estates with mills. Much consideration is given to this problem which the Station hopes to be able to bring to fruition at a not distant date.

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New premises have, at long last, been erected by the Public Works Department for the Sugarcane Research Station. The Station had been housed in the College of Agriculture for nearly two decades. His Excellency, the Officer Administering the Government, kindly agreed to lay the foundation stone of the new buildings on the 22nd June, 1949. The function was attended by a large gathering.

Better accommodation, more adequately equipped laboratories and prospects of a larger staff are the other highlights of sugar research in Mauritius.

In conclusion, the writer wishes to place on record his appreciation of the whole-hearted co-operation of the planting community, who is becoming more and more research-minded, of officers of the Station and of the Department of Agriculture. Every member of the Station's staff is urged to continue, even more energetically, the fruitful work already done, and is asked to bear in mind that trial and error, success and failure, are the keystone of progress.

A. DE SORNAY,
*Acting Officer-in-charge,
Sugarcane Research Station.*

PART I—CANE BREEDING DIVISION

Cane Breeding—M./49 Series

Climatic conditions were favourable for hybridization and seed setting in 1949. Arrows protruded earlier and were more abundant in the breeding plots than the previous year, with the result that a large number of crosses could be made, and that the breeding programme could be carried out according to expectation.

Crossing work was effected at Réduit and Pamplémousses during the period May—August. The number of crosses made at the stations was as follows:—

				Type of Cross			Totals
				Lantern	Bag	Open	
Réduit	...	...	...	141	0	29	170
Pamplémousses	...	...	...	0	20	34	54
Totals	...	...	...	141	20	63	224

No crosses were attempted at Hermitage Experimental Station in view of:—

- the unsatisfactory results obtained in 1948, and
- the large number of crosses that could be made at Réduit and Pamplémousses, from which a sufficiency of seedlings could be raised for first-year trials at all three experimental stations.

Open crosses were attempted in order to supplement the controlled crosses due to shortage of lanterns, but it is intended to discontinue them as soon as there will be an adequate number of lanterns. The aim in discontinuing

open crosses and concentrating on the controlled crosses is to ensure fertilization by pollen from desired male varieties, and to eliminate the large element of chance in the fertilization, by foreign pollen, when the female arrows are not protected by pollen proof devices. At Pamplemousses 20 crosses were made in bags with very satisfactory results; no crosses could be made in lanterns, due to the fact that the big lanterns in use previously were out of order.

The breeding policy is dominated by the need for producing special types of seedling canes capable of outclassing M.134/32 on the poor leached soils of the uplands. The need for finding a superior variety for such areas is making itself strongly felt, especially in view of the fact that new lands are being brought under cultivation in these localities.

The cross-pollination work involved a wide range of parent varieties and considerable use of crosses of:—

- (a) the mixed *Saccharum spontaneum* type;
- (b) the type including several *Saccharum* species.

The Barbados varieties could be used on a much larger scale than the preceding year; all of them tasseled, but it would appear that only B.3439, B.34104 and B.37172 are worth while using as parent varieties. B.3439, a noble cane, is very prolific, even when crossed with canes containing wild blood. B.34104—bred from B.H.10/12—proved a good female in general and was mated with many varieties—particularly M.99/34, which is a promising male parent, and M.63/39, M.213/40 and M.423/41—with the view of utilising B.H.10/12 blood, and of breeding progeny of value. B.37161, which is one of the best of the West Indian canes under our conditions, produced few seedlings, on the average, when crossed with various male parents. B.37172 was used on a small scale, but yielded many seedlings on being crossed with M.213/40 and M.423/41. Finally, B.3337 and B.4098 proved to be two weak males when crossed with several varieties.

About thirteen P.O.J.2878 × D.109 crosses have been made at Réduit and Pamplemousses, and over 1,000 seedlings obtained. This cross, from which M.134/32 was bred appears promising and has therefore been replicated as last year so as to raise as many seedlings as possible. Proven crosses have also been replicated to provide large seedling populations at all three centres.

Breeding Plots. The old breeding plots at Réduit have been uprooted, the newly planted ones having become fully established. New male and female varieties have been added to the breeding plots at Réduit and Pamplemousses in order to increase the range of parent varieties and the scope of the breeding work. The R.P.8 and Black Tanna canes in the female variety plots were allowed to stand over in the hope of obtaining flowers next flowering season.

* * *

Germination of the fuzz was, on the whole, satisfactory at Réduit but, as usual, far better at Pamplemousses. The excellent results obtained at the latter station have, however, been partially offset by the occurrence of damping-off disease due to overwatering of the seedlings boxes, but, fortunately, without serious results, owing to the high fuzz fertility.

The table below shows the extent of the breeding work, the number of seedlings raised and the number planted in the field.

Nature of Cross	Number of crosses made	Number of seedlings obtained	Number of seedlings planted in the field		
			C.E.S.	P.E.S.	H.E.S.
1. 4th Nobilized <i>S. spontaneum</i>	21	1,486	148	628	198
2. 5th Nobilized <i>S. spontaneum</i>	10	2,974	44	129	924
3. Mixed <i>S. spontaneum</i> crosses	105	27,775	4,124	4,100	3,592
4. Crosses involving several <i>Saccharum</i> species.	88	16,911	2,221	1,858	3,008
TOTAL. ...	224	49,146	6,537	6,715	7,722

Total number of seedlings planted in the field ... 20,974

There has been an exchange of seedlings between the experimental stations. Potting was carried out at Réduit and Pamplémousses to provide seedlings for planting in the field at these stations and at Hermitage.

In view of:

- (a) better nursery equipment, and
- (b) the encouraging results obtained with the potting out of seedlings at Hermitage in 1948, the investigations started last year were continued during the present year, but on a more extensive scale, 7,830 seedlings having been potted out from the seedling boxes supplied from Réduit and Pamplémousses.

Periodical inspections of the nursery, which now consists of 9 stone beds as against one last year, were made in order to examine the potted seedlings. The results of observations continued up to the time of transplanting the seedlings in the field are the following:—

- (a) Owing to the persistent low temperatures experienced up to the end of October, the seedlings suffered a set-back and took longer to recover than those at Réduit and Pamplémousses. The leaves turned purple after potting out and growth renewal took place in November. An obvious remedy is to erect a small greenhouse in which the seedlings would be potted and kept for a fortnight or more before transfer to the nursery beds.
- (b) The seedlings suffered from the wind. Steps are therefore being taken to provide adequate shelter by planting a bamboo hedge during the rainy season.
- (c) A high proportion of the seedlings, potted from boxes with a dense population of young plants, died away owing particularly to their poorly developed root system; while nearly 90 per cent of those derived from boxes containing a moderate number of seedlings were successful. The best results were obtained when there were up to 150 to 200 seedlings per pan. This suggests that all seedling boxes reserved for Hermitage should have an optimum population of seedlings. In view of the fact that crossing has been resumed at Pamplémousses, thus leaving more space available in the greenhouse at Réduit, it is intended to plant the fuzz from fertile crosses into as many as three boxes, so as to avoid crowding of the seedlings. Seedlings from very dense boxes never give entirely satisfactory results when potted out—even at Réduit and Pamplémousses.

- (d) Seedlings potted out at Hermitage and having grown well after going through the resting period, appear more vigorous after transplanting, than those potted out at Réduit and Pamplémousses and also transplanted at Hermitage. They are, in general, not as tall as those supplied from these stations, but they tiller more and look healthier. This difference in performance may be due to the fact that the growth of the potted seedlings transported from Réduit and Pamplémousses is checked for a while owing to their sudden transfer from warmer to cooler regions.

First Year Trials

(i) *Virgins—M./49 Series.* Owing to the exceedingly dry weather conditions prevailing in December, it was decided to proceed slowly with the field plantations of the 1949 seedlings. The bulk of the seedlings could, however, be transplanted in December, and the remaining few thousands were dealt with at the beginning of January, 1950. As usual, single-eyed cuttings of the standard variety M.134/32 were planted in the border and middle of each row of the seedling plots.

At Hermitage Experiment Station, a preliminary selection was carried out in the pot stage prior to transplanting, all weaklings being kept as recruits. In the light of experience gained the previous year, it is considered that such elimination is worth while adopting as a routine practice in order to avoid gappy stands. This practice is already bearing fruit: the percentage of blanks is far lower in the 1948 populations than in the two previous ones.

One of the causes of failure in obtaining a satisfactory start in seedlings at Hermitage is the repeated attack of the young shoots by borers, the incidence of which is high in the locality. Field observations made at the beginning of the year revealed that, particularly in the case of poorer seedlings, all the shoots are attacked and the plants eventually die off. Of course, the more vigorous ones offer better resistance and are more likely to survive during the critical stage. Efficient methods of borer control were therefore resorted to when planting the 1949 seedlings. Maize was planted in every second interline of the seedling plots at regular intervals, the first planting being effected about a fortnight before transplanting the seedlings themselves, so as to reduce borer incidence right from the beginning. The method has so far met with success. The seedling populations at Réduit and Pamplémousses have also always been interplanted with maize as a routine measure for combating borers; but due to a better start of the seedlings, one maize planting has proved sufficient.

Large populations obtained from proven crosses were planted at the Experimental Stations in order to increase the odds of producing superior offspring combining valuable commercial characteristics such as high yields of cane and sucrose, resistance to pests and diseases, etc,

Planting Distance. The spacing trials (*vide* 1948 Annual Report, page 9) showed that a distance of $4\frac{1}{2}$ feet between the rows and $3\frac{1}{2}$ feet between the seedlings constitutes a satisfactory spacing, being economical of ground space and reducing border effect. Wider spacing, although better from the standpoint of reducing competition, is too extravagant of space and cannot be recommended for the present. The aim should be always to allow a free expression of the phenotype.

(ii) *Virgins—M./48 series.* The 1948 virgin seedlings at Réduit and Pamplémousses were not selected owing to pressure of work and shortage of land to lay down second-trials. The seedlings at Pamplémousses had made good growth, but those at Réduit were rather backward, due to unfavourable climatic conditions. Selection at Hermitage will be carried out in August, 1950, so that the second-trials can be established at the most suitable planting season.

(iii) *Virgins—M./47 series.* The seedlings at Hermitage were selected in August, and 96 seedlings retained for planting direct in second-trials. This time, again, it is not possible to calculate the percentage of selected seedlings, in view of the high percentage of M.134/32 stools planted as recruits in the populations. As in 1948, the Brix of the selected seedlings was on the low side and much below that of those at Réduit and Pamplémousses. The population was uprooted after harvest and not allowed to grow in ratoons owing to the unsatisfactory stand.

(iv) *Ratoons—M./47 series.* Selection from the ratoon populations was carried out in September at Réduit, and in August and September at Pamplémousses, and 215 seedlings were selected out of a population of 17,220, or about 1.3 per cent, for further trials.

The policy in seedlings selection at present is to rely on ratoon selection at Réduit, where it is difficult to obtain a mature seedling crop early in the season. At Pamplémousses, selection can be carried out from both the virgin and ratoon populations, climatic conditions being more favourable for rapid growth of the cane. No selection has been carried out from the ratoons at Hermitage due to the high mortality of the seedlings; should better stands be obtained in the future, following the precautions taken at planting and referred to above, selection in ratoons might be considered.

As many seedlings as possible were selected, commensurate with the amount of available space, for planting second-trials. A firm insistence on the reduction of selection standards, within limits, so as to exploit the potentiality of the populations as much as possible, should be the dominant note of the cane breeder's aims. Obviously, the greater the number of varieties included in the selection programme, the less is the chance of some particularly valuable seedlings being rejected without trial.

Second Year Trials

1. *Trials laid down.* Twenty-two trials have been laid down during the year, 20 at Réduit, 1 at Pamplémousses and 1 at Hermitage. These trials comprise selections of the M./45, M./46 and M./47 series. The trials at Pamplémousses and Hermitage contain a large number of seedlings.

A new method of layout has been adopted ; it constitutes more or less a challenge to the designs in vogue so far ; and it will serve a useful purpose to compare them together.

(a) Old Method.

Seedlings selected from virgin and ratoon populations are planted in propagation plots, there being one line of 10 to 12 holes of each seedling. A few rows of a standard variety, generally M.134/32, are planted, as a rule, but are spaced out and too far away from some of the seedlings for sound comparison of performance. When the canes are ready for planting in second trials, the propagation plots are examined and a partial selection carried out, the canes not being weighed or analysed for Brix or sucrose. The selected seedlings are planted in second-trials consisting of 4 replications of each seedling and 2-row plots of 5 to 7 holes per row. The standard variety M.134/32 occurs once in each block. The number of seedlings per trial varies from 6 to 12. The second-trials are harvested in virgins and first ratoons only, the yield of cane and the Brix being recorded. The selected seedlings are planted in propagation plots, laid down in the same way as the above mentioned ones, prior to further testing in third and variety trials.

(b) New Method.

Seedlings selected from virgin and ratoon populations are planted in second-trials, the method of layout being as follows:—

Each unit includes 5 to 10 selected seedlings, depending on the space available, arranged in two blocks. There is one line of 6 holes of each seedling per block, and 3 to 4 lines of the standard variety per block. The method of distributing the seedlings in the blocks is that of randomization with limitations as in the ordinary trials (old method). A sketch plan of one of the trials is presented below.

6 holes ..	4	2	S	7	1	S	3	5	6	S	Block II
6 holes ...	S	1	3	5	S	2	6	S	4	7	Block I

S = standard.

The trials are grown in virgins, first and second ratoons. At harvest, each line of canes is examined for arrows, diseases, etc., and then analysed for Brix and weighed. It is proposed to test the juice for glucose in the near future.

Selection is carried out in second-ratoons, due consideration being given to the results in virgins and first-ratoons as well, and the selected seedlings are planted in multiplication plots prior to testing in third-trials, or even direct in variety-trials on estates. Very promising seedlings giving outstanding results in virgin and first-ratoons will be selected in first-ratoons and planted in third or variety trials to save time.

(c) Advantages and disadvantages of the new method versus the old method.

- (i) The main idea underlying the new method of laying out second-trials is to gauge the ratooning capacity of the newly bred seedlings at an early stage of the breeding work. A very large proportion of the seedlings tested in second-trials has very poor ratooning qualities as compared with M.134/32. In that connection, reference must be made to the results of eight trials reaped in virgins and ratoons in 1947 and 1948 at the Central Experiment Station. These results are illuminating and show that, out of a total of 47 seedlings under trial, only 3 seedlings were selected, the results of both the virgin and ratoon crops being taken into account. It must be borne in mind that one of the major problems of cane breeding in this island nowadays is the production of a cane variety capable of competing with M.134/32 which has an exceptionally high ratooning power. The new method of early testing the ratooning qualities of new seedlings is, in the light of the above arguments, more advantageous than the old one.
- (ii) There are two replications in the new layout as against four in the ordinary second-trials, and there is thus a more effective control over error in the latter. This disadvantage is compensated by the larger number of repetitions of the rows of the standard variety in the new type of trial: 3 to 4 per block as compared with one in the routine second-trials. One of the most important factors in experiments laid down to test the relative value of new seedlings is the direct comparison with a standard variety: each variety under test should be as near as possible to the standard. On this ground, therefore, the new design is better than the old.
- (iii) There are 2 rows per plot of each variety in the ordinary trials and one only in the new system of layout. There is, as a consequence, more interaction between the varieties in the new trials, a point in favour of the old trials. Interaction effects generally decrease in ratoons, due to their more erect growth, and may accordingly more or less even out on considering the results of the complete cycle (virgins and ratoons). In the last trials planted, the distance between the lines has been increased from 5 to 6 feet to reduce border effect; it cannot be increased more owing to economy of land.

- (iv) The new design requires less ground space and is more labour saving.
- (v) The new method of testing selected seedlings considerably simplifies the breeding work and is likely to yield more rapid results. Quick methods are needed for sorting out the valuable lines from the mass of their less successful fellows.

2. *Trials harvested.* Forty-five second trials have been harvested, 28 in virgins and 17 in ratoons.

Forty-three seedlings have been retained and either planted direct in third-trials or in propagation plots pending the proper planting season for laying down third-trials next year. A certain number of seedlings has been provisionally selected from the virgin trials, but has not been multiplied as the real test of their value will come when the ratoons are harvested.

Third Year Trials

1. *Trials laid down.* Seven trials have been planted during the year, 2 at Réduit, 4 at Pamplémousses and 1 at Hermitage to test seedlings of the M./42 to M./45 series against M.134/32. Some of the seedlings included in these trials appear to show promise.

2. *Trials harvested.* Seven trials have been cut during the crop, 3 at Réduit, 3 at Pamplémousses and 1 at Hermitage. One of the trials was in virgins and the remainder in ratoons.

At Réduit, out of 10 seedlings under trial, one only, viz., M.147/41 was selected for planting in variety-trials; two others namely, M.143/41 and M.145/41 were retained for breeding purposes. In the case of trial 81 reaped in ratoons at Pamplémousses, M.156/42 and M.168/42 have been selected in addition to four other seedling canes retained in virgins last year, most of which have also given good results in ratoons. The variety M.11/43, although not surpassing M.134/32 in the virgin crop in trial 82, has considerably out-yielded the standard in ratoons, giving nearly 50 per cent more sugar per arpent; its juice purity and *richesse* are higher than those of M.134/32. In view of these promising results, the variety has been multiplied and will be included in several trials next year. M.15/43 was selected from the same trial, but was not significantly superior to the standard.

Two interesting ratoon selections were made from trial 83 at Hermitage: M.296/41 and M.311/41. The latter appears the more promising of the two; it is a fast grower even at Hermitage which is a cool and rainy locality. A row of it growing near an irrigation basin at the Central Experiment Station yielded canes with very long internodes and much longer than those of M.134/32 also benefitting from the water supply. In view of its apparent response to irrigation water, it has been included in a trial under irrigation in the Black River District and in various other trials.

The policy with regard to third-trials' results has been to select in first-ratoons only, due regard being paid to the virgins results. It is a pity that, owing particularly to space shortage, third-trials cannot be harvested in second-ratoons. They constitute the nurseries from which selections are made for testing under a multitude of ecological conditions over the whole Island. It would be a great advantage to have good knowledge of the qualities of the selected canes, especially ratooning capacity, so as to save time, space and labour. The results of second ratoons are often the mean of the complete cycle and are therefore more trustworthy than those of the two previous crops.

Variety Trials

1. *Trials laid down.* During the period under review, twelve variety trials have been laid down on estates to test various seedling canes raised by the Sugarcane Research Station; the West Indian varieties B.3337, B.3439, B.34104, B.37161, B.37172, B.4098; and E.1/37 and E.26/42, bred at Highlands S.E., in comparison with M.134/32. The distribution of these varieties is set out below.

<i>Varieties</i>	<i>Number of trials</i>
M. 213/40	32
M. 423/41	29
Barbados canes	25
E. 1/37	11
E. 26/42	3

The total number of variety trials to harvest in 1950 will be 62, unless it is decided to abandon those containing unpromising local seedlings and M.423/41 which has been released.

In view of the unsatisfactory results obtained with some of the Barbados varieties, only the most promising ones, that is, B.34104, B.37161 and B.37172 have been included in the trials planted during the year, except in one or two cases.

The standard method of layout adopted for variety trials consists of 4 compact blocks of 4 row plots, the length of the rows in each plot being 30 to 40 feet, depending on amount of planting material and space available. In the case of two trials, a new type of layout was investigated; instead of having four adjoining blocks as usual, two blocks have been laid down in one part of an estate and two in another part. The splitting of the trial in this way ensures a better distribution in space of the varieties being investigated and, through broadening the scope of the experiment, is likely to furnish more trustworthy results. These trials have been planted at Tamarin S.E. on scrub land being opened up for cane cultivation.

A variety trial was planted at Belle Isle Estate to test three of the Barbados varieties and M.423/41 against two standards: M.134/32 and B.H.10/12. The second standard (B.H.10/12) was included in the experiment, as some planters think that it is still capable of giving good yields in

certain localities of Black River where irrigation water is abundant ; it is a variety which has virtually gone out of cultivation and is now confined to certain restricted areas.

Curiously enough, despite its deterioration, it germinated better, and, a month or two after planting, its shoots were longer than those of the other varieties in the trial. At the time of writing, it has been overtaken by three of the varieties, and it is doubtful whether it will maintain its rank at harvest.

2. *Trials harvested.* Forty-four trials have been harvested during the crop season, 25 in virgins and 19 in ratoons, as compared with a total of 24 the previous year. As customary, owing to economy of space in this report, the results of the individual trials will not be presented, and only the trials containing the Barbados canes, the Sugarcane Research Station varieties M.213/40 and M.423/41, and E.1/37 will be considered.

(a) *Trials containing M.213/40 and M.423/41.* The results of a large number of tests, in virgins, first—and second—ratoons, made during the period 1945—1949 are given in the following tables.

M. 213/40

				Virgins (Mean of 27 trials)	1st ratoons (Mean of 15 trials)	2nd ratoons (Mean of 7 trials)	Average 49 Tests
Tons cane per arpent	{	M. 213/40	...	41.9	42.3	43.0	42.2
	{	M. 134/32	...	33.7	34.2	33.4	33.8
	{	Difference	...	+ 8.2	+ 8.1	+ 9.6	+ 8.4
	{	Per cent	...	24.3	23.6	28.7	24.8
Juice Purity per cent	{	M. 213/40	...	80.3	84.1	83.2	81.7
	{	M. 134/32	...	82.6	86.0	84.9	84.0
	{	Difference	...	- 2.3	- 1.9	- 1.7	- 2.3
C.C.S. per cent cane	{	M. 213/40	...	11.8	12.9	12.6	12.3
	{	M. 134/32	...	12.5	13.4	12.9	12.9
	{	Difference	...	- 0.7	- 0.5	- 0.3	- 0.6
Tons C.C.S. per arpent	{	M. 213/40	...	4.92	5.48	5.36	5.16
	{	M. 134/32	...	4.19	4.61	4.28	4.32
	{	Difference	...	+ 0.73	+ 0.87	+ 1.08	+ 0.84
	{	Per cent	...	17.4	18.8	25.2	19.4

M. 423/41

				Virgins (Mean of 22 trials)	1st ratoons (Mean of 8 trials)	2nd ratoons (Mean of 2 trials)	Average 32 Tests
Tons cane per arpent	{	M. 423/41	...	41.7	37.3	31.9	40.0
	{	M. 134/32	...	34.1	31.7	29.3	33.2
	{	Difference	...	+ 7.6	+ 5.6	+ 2.6	+ 6.8
	{	Per cent	...	22.2	17.6	8.8	20.5
Juice Purity per cent	{	M. 423/41	...	82.7	86.3	82.9	83.6
	{	M. 134/32	...	83.0	87.6	84.6	84.2
	{	Difference	...	- 0.3	- 1.3	- 1.7	- 0.6
C.C.S. per cent cane	{	M. 423/41	...	12.3	13.8	13.0	12.7
	{	M. 134/32	...	12.8	14.8	14.1	13.4
	{	Difference	...	- 0.5	- 1.0	- 1.1	- 0.7
Tons C.C.S. per arpent	{	M. 423/41	...	5.17	5.08	4.18	5.08
	{	M. 134/32	...	4.37	4.71	4.12	4.44
	{	Difference	...	+ 0.80	+ 0.37	+ 0.06	+ 0.64
	{	Per cent	...	18.3	7.8	1.4	14.4

Crushing tests to study their factory qualities have been made by the Central Board of the Department of Agriculture with the following results:—

<i>Varieties</i>	<i>Juice Purity %</i>	<i>Fibre % cane</i>
M. 213/40 ...	80.7*	10.4
M. 134/32 ...	86.8	12.3
Difference ...	— 6.1	— 1.9
M. 423/41 ...	88.2†	10.9
M. 134/32 ...	88.5	12.2
Difference ...	— 0.3	— 1.3

It may be concluded from the preceding figures that both M.213/40 and M.423/41 have considerably surpassed M.134/32 in yield of cane and sugar. M.213/40 labours under one disadvantage; its average juice purity is markedly below that of M.134/32. This variety appears to be better suited to the lower lying localities of Savane and Grand Port Districts, where the results of variety trials showed that its juice purity was only 1.0 per cent below that of M.134/32, as against 2.8 per cent in the North and 4.8 per cent in the high rainfall localities of the island. It appears more resistant to borers than either M.134/32 or M.423/41.

M.423/41, although producing lower yields of cane and sugar than M.213/40, is probably the more economical of the two. It is a slower grower than M.213/40 and M.134/32, but its stem is thicker than that of 134/32, a factor conducive to higher cane tonnages. At harvest, it is generally shorter than M.134/32, and should therefore prove more resistant to the destructive effects of cyclonic winds. It arrows very little in general, while M.213/40 has a tendency to arrow earlier and more profusely than M.134/32. Counts of arrowed canes made in certain variety trials during the crop gave the following results:—

<i>Variety</i>	<i>Arrows % cane</i>
{ M.213/40	16
{ M.134/32	10
{ M.423/41	1
{ M.134/32	18

The juice purity figures available are too erratic to allow of definite conclusions being drawn regarding maturity trends in these varieties, but like most seedling canes of similar derivation, they are, in all probability, late maturing.

All the results obtained with M.213/40 and M.423/41 have been submitted for consideration by the Cane Release Committee.

Stocks of these varieties have been built up on estates with factories since last year in view of their prospective distribution in 1950.

(b) *Trials containing the Barbados varieties.* A large number of experiments containing these varieties has been reaped in 1949, three in ratoons and the rest in virgins.

* Mean of 8 tests (in two of which M. 213/40 gave very low juice purities for some unknown reason).

† Mean of 6 tests.

Trial 192—Hermitage (First Ratoons—not irrigated).

B.3337 was the only variety to beat M.134/32 in yield of cane ; B.3439 was significantly inferior to the standard. B.34104, B.4098 and B.3439 were inferior to M.134/32 in yield of sugar. In virgins, B.3337 significantly out-yielded the standard in yield of cane and sugar.

Trial 193—Réduit (First Ratoons—not irrigated).

B.3439 was statistically inferior to M.134/32 in yield of cane and sugar ; B.4098 was surpassed by the standard in sugar output only. These varieties gave similar results in virgins last year.

Trial 194—Pamplémousses (First Ratoons—not irrigated).

B.34104 was the sole variety to yield more sugar than M.134/32 ; there was no significant difference between the other B. canes and the standard. In virgins, M.134/32 had been outclassed by B.34104, B.37161 and B.37172.

* * *

It would appear from these results that B.34104 is the only Barbados variety which has been able to perform better than M.134/32 in ratoons, but it is necessary to await for more data before the ratooning capacity of these West Indian canes can be gauged in comparison with that of M.134/32.

The results of trials 192 and 193 in C.C.S (Commercial cane sugar) were calculated by two methods: (1) from the actual data, and (2) from the standard error of a product formula, with the following results:—

Method	Standard Error	Significant Difference
TRIAL 192		
(i) Actual data	0.12	0.37
(ii) Standard error of product formula.	0.13	0.40
TRIAL 193		
(i) Actual data	0.23	0.71
(ii) Standard error of product formula.	0.19	0.56

There was thus little difference between the results as calculated by the two methods, and the conclusions drawn regarding the significant difference between the varieties under trial were the same. Last year the two methods gave quite different results in the case of trial 192 (virgins), the great difference being ascribed to sampling errors.

The standard error of a product formula might be used with advantage when dealing with second—and third-trials' results, paucity of data preventing definite conclusions being drawn regarding the inferiority or superiority of a particular variety under test. When the results of a large number of experiments are available, the first method, which has been used up to now, should prove reliable. The second method involves more arithmetical work and is therefore more time consuming, a factor which cannot be overlooked. It must also be borne in mind that, owing to the complexity of agricultural experiments, exact mathematical calculations do not lead very far, because there are too many imponderables.

As far as the results of the plant cane trials are concerned, and these bulk fairly largely, it appears that they are more or less a repetition of the previous year's findings, that is, that B.37161, B.34104 and B.37172 are the most promising of the B. canes, but undue stress should not be placed on the order of merit. The variety B. 3337 has given good cane tonnages in certain trials, but it is not as rich as M.134/32. It would appear that B.37161 is very likely the best of the six B. varieties, and it looks very much like being a general purpose cane as in Barbados, its country of origin.

(c) *Trials containing E.1/37.* This cane is a complex hybrid bred from P.O.J.2878, Uba Marot and two noble canes by Highlands S.E. It has been included in 11 trials of which 7 have been reaped in virgins in 1949. An examination of the results of these trials reveals that this variety has outclassed M.134/32 only in the cool and high rainfall localities of the island, and that it appears particularly adapted to regions displaying such climatic types. In that connection, the results of two variety trials harvested at Britannia S.E. are interesting. In the first experiment situated near the factory at 700 feet altitude, E.1/37 produced approximately the same cane and sugar tonnages as M.134/32, while at St. Avold, a cool and rainy locality, at 1,000 –1,200 feet, it has produced in twelve months nearly twice as much sugar as M.134/32. In the low lying dry regions, it does not appear to be able to crop as well as M.134/32, even under irrigation. These conclusions, although probably not biassed, will naturally have more weight when the ratoons results become available.

(d) The trial with split-plots laid down at Bénarès S.E. in October 1948, to test the responses of M.213/40 and M.423/41 to normal and double dressings of nitrogen, was harvested this year. The results bring up interesting issues, but it is not possible at the present to draw any definite conclusions owing to insufficiency of data.

A second trial to study the response of M.423/41, in comparison with M.134/32, to high fertilization was laid down at Réduit by the Chemical Division of the Station. The importance of experiments of this type is obvious ; it is becoming more and more recognised that the nutritional factor is as important as the varietal factor. In plant breeding work, variations in the surrounding medium are of the greatest importance if a proper relationship between environment and genetic type is to be evaluated.

Use of Calculator for the rapid recording of Trials' Results

A method was devised last year for *rapidly recording* the plot yields of second, third and variety trials. It consists in determining the total weight of the gang of labourers engaged in weighing the canes, collecting the cut canes from one plot into bundles whose number is equal to or is a multiple of the numbers of men available. After checking the number of bundles, and adjusting it if necessary, the bundles of canes are weighed over a portable spring scale *as usual* and the individual weights recorded with a calculating

machine (Addiator Calculator). When all the bundles from one plot have been weighed, the labourers' tare, or a multiple thereof, is subtracted and the plot yield read on the addiator and recorded on a small plan of the trial previously made.

The method requires care, but with concentration and a little practice, no errors are likely to be made. It has the following advantages—

- (1) completely eliminating computations, a factor of the utmost importance when the results of a large number of experiments have to be recorded ;
- (2) reducing the amount of recording to a minimum ;
- (3) allowing the field officer to follow the crop's results ;
- (4) obtaining the trials's results immediately after harvest ;
- (5) last but not least, ascertaining rapidly whether all the canes from one plot, and all the plots have been weighed.

Other Investigations

1. CONTROL OF ARROWING

(a) *Photoperiodism*. B.H.10/12 layers were made in November 1948, and, after adequate root production, transferred to the bottom of trenches 6' x 3' x 9' in batches of three. They were planted in a mixture of soil and farmyard manure and left thus for a period of two to three weeks. After resumed growth, the batches were exposed to 2, 3, 4, 5, 6, 7, and 8 hours sunlight respectively, one batch being kept as control. The covers used to keep the trenches dark were made of bamboo, cane trash and gunny ; the arrangement was at best a makeshift.

The experiment was continued up to the end of June, that is, well after the arrowing season had commenced. Negative results were obtained, failure being ascribed to the difficulty of keeping the covers absolutely light proof—although the trenches were pitch dark at the beginning—particularly towards the end of the experiment, and preventing the sides of the trenches from crumbling down. Considerable curvature of the covers occurred after a time, and bamboo sticks had to be placed across the trenches to keep them straight. The method appears altogether unsatisfactory and cannot be recommended.

(b) *Geotropic stimulation*. Van Overbeek and Cruzado succeeded in inducing flowering in the Cabezona pineapple by the method of geotropic stimulation. It was found that when vegetative plants of this variety of pineapple were kept in a horizontal position, not only did they curve upwards, but flowers were also produced. A minimum of three days of stimulation is required for flower induction. These investigators have presented evidence which indicates that the geotropic flower induction in the Cabezona pineapple is auxin controlled,

The method was applied to the cane varieties R.P.8 and B.H.10/12 which very seldom tassel in Mauritius. The tallest canes available at the Central Experiment Station were bent in March and kept in a horizontal position by means of forked wooden pegs fixed to the ground, curvature of the tops taking place after about 15 days. A few canes were kept erect as control, and others which had lodged owing to wind action and curved at the top, were also kept under observation.

Not a single arrow was obtained. It is quite possible that a time factor might come into play and that the experiment should be made at a definite period. The investigations will therefore be repeated next flowering season.

(c) *Control of Growth Conditions.* A third series of experiments was begun to investigate the effects of high dressings of phosphates, in combination with nitrogen, on flower induction in B.H.10/12.

A small plot of this variety was divided into 10 sub-plots to which the following artificials have been applied—

- | | |
|--------------------------------|-------------------------------------|
| (i) Double dose nitrogen | = 200 Kgs. sulphate of ammonia p.a. |
| (ii) Triple dose nitrogen | = 300 Kgs. sulphate of ammonia p.a. |
| (iii) Triple dose phosphates | = 600 Kgs. phosphatic guano p.a. |
| (iv) Quadruple dose phosphates | = 800 Kgs. phosphatic guano p.a. |
| (v) Double dose nitrogen | + triple dose phosphate. |
| (vi) Triple dose nitrogen | + quadruple dose phosphate. |

Four of the plots were kept as control and received single doses of nitrogen and phosphates. Muriate of potash was, in addition, applied to all the plots at the rate of 50 kgs. p.a.

The experiment will be continued up to the end of the 1950 arrowing season and the results, if any, will be reported in due course.

2. POLLEN STORAGE

Investigations carried out in 1948 showed that the most practical method of storing pollen for breeding purposes consists in keeping the pollen grains themselves in a refrigerator at low temperatures.

Uba Marot pollen was collected on the 17th June, 1949 and transferred to small glass tubes which were loosely plugged with cotton wool. The tubes were introduced into a large stoppered boiling tube. No moist cotton wool was placed at the bottom of the boiling tube as in the previous series of experiments, and, as a result, it would appear that the pollen was in a better condition and that much higher percentage of germinations on artificial culture medium was obtained this year.

The boiling tube was kept in a refrigerator in which the temperature varied from about 0-6°C. The fertility of the pollen was tested every morning, for a period of 10 consecutive days, by germination on artificial culture medium composed of agar agar and sucrose at a mean temperature of about 25°C.

The pollen could be kept in a viable condition for 10 days, the grains retaining their maximum fertility for a week, the percentage of germinations and the length of the pollen tubes being nearly the same as on the first day.

A few other similar experiments were conducted with pollen from other varieties with varying results. It is possible that, with a more refined technique, the life span of the pollen could be increased.

At the end of the experiment, the pollen occurred in lumps and being somewhat moist, was not in proper condition for pollination. When removed from the small tubes and exposed to sunlight on microscope slides, it soon reverted to a powdery condition suitable for pollination.

A thermo-flask for storing pollen for export by air to South Africa for crossing purposes was received from Mount Edgecombe Experimental Station towards the end of the last arrowing season and will be used in 1950. Experiments are to be conducted before hand to determine how long ice keeps in the apparatus.

3. EFFECT OF SOURCE OF PLANTING MATERIAL ON CANE YIELDS

The object of the experiment is to test whether any significant difference in yield of cane and behaviour can be correlated with the origin of the planting material. For this purpose, three 5 x 5 Latin squares have been laid down at Réduit, Pamplemousses and Hermitage, planting material of M.134/32 being obtained from the following sources: Réduit, Pamplemousses, Hermitage, Union (Savane) S.E. and St. Antoine S.E., the various localities exhibiting different environmental conditions. All the canes used for the experiments were obtained from 10-12 month virgins.

Every precaution was taken to see that all cuttings were similarly treated, that the same proportion of tops and body cuttings were planted per line, etc., so that any difference between yield of cane and behaviour might be ascribed to some factor in the cuttings from the different sources themselves.

There has been, up to now, considerable variation in the germination and rate of growth of the young shoots according to the source of the planting material. The setts from Union S.E. gave the best results and were closely followed by those from St. Antoine S.E., despite the fact that those from the latter estate were badly infested with borers. The cuttings from the three experimental stations were markedly inferior to those from the two estates and there was little difference between them. At the time of writing the canes are about 7 months old and the differences are still noticeable, particularly at Réduit and Hermitage. The crucial test will, however, be yield of cane and behaviour at harvest.

4. CORRELATION STUDIES

The correlation between Brix and stool weight in a seedling population bred from the cross M.134/32 $\times$ M.99/34 was studied. This cross gives rise to high yielding seedlings, but generally rather poor in sucrose content. The correlation coefficient work out to $+0.127 \pm 0.05$ and was therefore low and non-significant.

Of course, these investigations will have to be pursued and more seedling populations studied in order to obtain trustworthy results. If similar low coefficients are obtained, they will go to prove that it is necessary to grow large populations of seedlings derived from such a type of cross, so as to increase the chance of producing vigorous and rich agrotypes. This has been assumed for the present and given effect to, this year.

The difficulties inherent in such correlation studies are the following:—

- (1) interaction between adjacent seedlings in any one row ;
- (2) the differential rates of maturing of the seedlings ; different correlation coefficients might be found for the same seedling population at different periods of the crop season.

The first factor can be partially overcome by increasing the planting distance between the consecutive seedlings, and the second by studying populations from the same cross at different periods.

Export of Cane and Fuzz

Cuttings of several local varieties and Barbados varieties have been exported by air to the following countries: South Africa, Portuguese East Africa, Nossi-Bé and Madagascar. Applications for export by surface route have been received from Argentina, Ceylon and Pakistan, but could not be entertained as yet owing to lack of shipping facilities.

Six cuttings of each of the varieties M.134/32 and M.63/39 were despatched by air to England for growing at Kew Gardens. Fuzz from 9 crosses was sent by air to Egypt and Pakistan.

The following exhibits have been sent to England in connection with the Gardens Show held in London in July last:—

- (i) Live cane plants of M.134/32 and M.63/39 in tubs by sea towards the end of May. The plants were at various growth stages, and a few of the canes were showing signs of arrowing ;
- (ii) Bundles of 6 canes of each of eight varieties bred by the Sugarcane Research Station ;
- (iii) Fuzz from five crosses (P.O.J.2878 $\times$ Uba Marot) to be sown at Kew at various intervals. A sample of the fuzz was tested here and proved very fertile ;
- (iv) A sample of fuzz in a large specimen bottle (to be exhibited as such ;
- (v) A chart in water colours of the pedigree of M.134/32 painted by Mr. L. Masson.

Specimens (ii)—(v) have been despatched by air.

Imported Varieties

The canes imported from abroad, namely Q.28, 32-8560, C.P.34-120, C.P.36-13, C.P.36-105, which had been multiplied in the open at Réduit during the first quarter of the period under review, had to be destroyed owing to the occurrence of a new and as yet unidentified disease on Q.28 in Queensland. The first two varieties had been imported from Australia, and the C.P. canes from U.S.A., but all had been grown at the same time and in the same greenhouse where danger of contamination was great and warranted their destruction. For further details, the reader is referred to the Annual Report of the Department of Agriculture for 1949.

A few cuttings of each of the varieties Co. 419, Co.421 and C.P.34-120 have been received from South Africa in November last, and planted in the newly erected Quarantine Greenhouse at the Central Experiment Station. Cuttings of a few other sugarcane varieties ordered from U.S.A. have been received in January 1950.

A. DE SORNAVY,
Plant Breeder.

PART II—CHEMICAL DIVISION

Throughout the year under review, the Division of Chemistry remained understaffed, and so the research work contemplated had to be curtailed as the writer had to give much of his time to the routine work in connection with the upkeep of field experiments on estates and at the Central Experimental Station.

The main series of field experiments on estates was the 3N × 3P × 3K one, in connection with the development of the foliar diagnosis technique for determining the nutrient status of the cane plant. These experiments were harvested in 3rd ratoons and are being continued in 4th ratoons.

A further series of factorial experiments including Lime, Potash and Magnesia, at three levels, was harvested in *petite saison* and the results are presented in this report.

At the request of the Conservator of Forests, a soil survey of the Crown lands was undertaken. Only the preliminary work in this connection was carried out. This necessitated frequent visits to the Crown lands for the selection of suitable sites for profile cuts and for the taking of soil samples which were subsequently prepared in the laboratory.

Unfortunately very little analytical work could be done. This was due, not only to shortage of staff, but also to the fact that the chemicals and new equipment required for the change in analytical methods, as contemplated in last year's report, had not yet been received.

Lectures were delivered to the newly appointed Field Demonstrators. These lectures were intended to give them a general knowledge of:—

- (a) Soils and soil types encountered in the island, their properties and management.
- (b) Fertilizers, amendments and their use.
- (c) Control of the nutritional status of the sugarcane plant by foliar diagnosis.

The writer also visited a few plantations on request, and advice was given in cases of mineral deficiency.

Fertilizer Trials on Estates

The number of $3N \times 3P \times 3K$ factorial experiments on estates was reduced to sixteen, one having been abandoned. Of the experiments left, one was harvested by mistake, and plot weights were, therefore, not recorded, so that only results of fifteen experiments are presented here.

It might well be recalled that these experiments, consisting of 27 plots derived from every combination of Nitrogenous, Phosphatic and Potassic fertilization, at three levels each, were started a few years ago with a view to obtaining different nutritional status within the cane plant, whereby simple analysis of a definite portion of a leaf blade will provide a test of the mineral nutrition which could be correlated to final yield. In other words, this test would provide the optimum content in N, P_2O_5 and K_2O of that part of the leaf blade below which content an application of the appropriate fertilizer will result in an increase in yield of cane.

Two of the fifteen trials were fourth ratoons and the remainder third ratoons.

The fertilizers were applied in the form of Sulphate of Ammonia, Phosphatic Guano and Muriate of Potash, and quantities applied are given below in Kgs. of N, P_2O_5 and K_2O per arpent—

		0	1	2
N	...	Nil	30	60
P_2O_5	...	Nil	25	50
K_2O	...	Nil	30	60

The results are presented in Table 1, together with the corresponding Index of Vegetative Growth.

Table II gives the results of the statistical analysis of the same series of trials, showing the main effects and the interactions between the major elements.

TABLE I
TABULATED RESULTS OF NPK FACTORIAL EXPERIMENTS ON ESTATES (1949)

Locality	Category	Comparative Yield of Millable Cane										Index of Vegetative Growth																			
		Nitrogen					Phosphoric Acid					Potash					Nitrogen					Phosphoric Acid					Potash				
		ON (a)	IN	2N	OP (a)	IP	2P	OK (a)	IK	2K	ON (b)	IN	2N	OP (b)	IP	2P	OK (b)	IK	2K	ON (c)	IN	2N	OP (c)	IP	2P	OK (c)	IK	2K			
Solitude	...	100 (17.1)	155	177	100 (25.2)	98	95	100 (22.7)	108	118	100 (62.3)	132	136	100 (76.2)	100	102	100 (78.2)	96	98	100 (62.3)	132	136	100 (76.2)	100	102	100 (78.2)	96	98			
Bon Espoir	...	100 (12.0)	140	160	100 (15.4)	108	104	100 (16.0)	96	104	100 (54.7)	124	130	100 (64.2)	102	100	100 (65.3)	100	96	100 (54.7)	124	130	100 (64.2)	102	100	100 (65.3)	100	96			
Britannia	...	100 (23.3)	121	130	100 (25.5)	114	107	100 (27.0)	99	103	100 (66.6)	117	128	100 (75.0)	103	102	100 (75.2)	103	102	100 (66.6)	117	128	100 (75.0)	103	102	100 (75.2)	103	102			
Bénarès	...	100 (24.0)	127	124	100 (27.9)	102	100	100 (27.9)	103	99	100 (72.6)	123	129	100 (84.7)	101	101	100 (84.6)	99	103	100 (72.6)	123	129	100 (84.7)	101	101	100 (84.6)	99	103			
Savinia	...	100 (27.7)	114	116	100 (29.6)	99	111	100 (29.0)	107	109	100 (89.2)	106	107	100 (91.6)	101	104	100 (92.2)	102	101	100 (89.2)	106	107	100 (91.6)	101	104	100 (92.2)	102	101			
Riche-en-Eau...	...	100 (26.5)	136	143	100 (34.6)	99	91	100 (32.9)	98	105	100 (72.0)	115	115	100 (79.1)	101	100	100 (77.5)	102	105	100 (72.0)	115	115	100 (79.1)	101	100	100 (77.5)	102	105			
Beau Vallon	...	100 (15.5)	152	182	100 (22.2)	99	99	100 (21.6)	106	106	100 (64.7)	126	135	100 (77.7)	101	100	100 (76.2)	103	103	100 (64.7)	126	135	100 (77.7)	101	100	100 (76.2)	103	103			
Union Flacq	...	100 (22.0)	116	131	100 (25.1)	106	98	100 (23.8)	104	117	100 (63.2)	120	121	100 (72.6)	100	98	100 (68.9)	106	107	100 (63.2)	120	121	100 (72.6)	100	98	100 (68.9)	106	107			
Savannah	...	100 (22.7)	133	135	100 (27.0)	104	107	100 (28.0)	97	102	100 (62.2)	132	147	100 (78.8)	98	101	100 (77.6)	100	103	100 (62.2)	132	147	100 (78.8)	98	101	100 (77.6)	100	103			
Mont Choisy	...	100 (12.9)	150	154	100 (17.2)	101	102	100 (17.8)	97	96	100 (56.3)	130	135	100 (66.8)	105	103	100 (68.1)	100	102	100 (56.3)	130	135	100 (66.8)	105	103	100 (68.1)	100	102			
Pierrefonds	...	100 (28.7)	132	148	100 (36.4)	103	97	100 (34.9)	104	108	100 (66.2)	120	129	100 (78.3)	96	99	100 (75.8)	100	103	100 (66.2)	120	129	100 (78.3)	96	99	100 (75.8)	100	103			
Rose Belle	...	100 (25.0)	115	126	100 (25.0)	114	128	100 (27.6)	104	105	100 (93.6)	103	110	100 (91.5)	104	110	100 (93.0)	106	103	100 (93.6)	103	110	100 (91.5)	104	110	100 (93.0)	106	103			
Deep River	...	100 (24.2)	118	134	100 (29.0)	100	98	100 (28.9)	96	103	100 (74.1)	117	117	100 (81.3)	101	103	100 (81.0)	101	103	100 (74.1)	117	117	100 (81.3)	101	103	100 (81.0)	101	103			
Henrietta	...	100 (17.6)	144	155	100 (22.4)	97	116	100 (23.9)	96	97	100 (64.9)	122	129	100 (74.6)	101	104	100 (76.2)	99	100	100 (64.9)	122	129	100 (74.6)	101	104	100 (76.2)	99	100			
Beau Champ	...	100 (21.9)	135	149	100 (29.2)	96	91	100 (27.9)	93	107	100 (66.8)	128	136	100 (81.0)	100	100	100 (80.1)	100	103	100 (66.8)	128	136	100 (81.0)	100	100	100 (80.1)	100	103			
General Average	...	21.4	27.9	30.2	26.1	26.7	26.7	26.0	26.2	27.4	100	121	127	100	101	102	100	101	102	100	121	127	100	101	102	100	101	102			
Comparative Yield	...	100	130	141	100	102	102	100	101	105	100	121	127	100	101	102	100	101	102	100	121	127	100	101	102	100	101	102			

(a) Actual yield in tons cane per arpent, represented by 100 is given in brackets.

(b) Actual weight of 30 leaves of 3rd rank, represented by 100 is given in brackets

TABLE II
RESULTS OF STATISTICAL ANALYSIS OF NPK TRIALS

Category and Locality of Trials	Linear Response				Curvature				Interaction				Standard Error % Mean
	N	P	K	Sig. diff. (20 : 1)	N	P	K	Sig. diff. (20 : 1)	NP	NK	PK	Sig. diff. (20 : 1)	
4TH RATOONS :													
Solitude ...	+ 13.2*	- 1.2	+ 4.1	± 4.2	- 5.6	- 0.2	+ 0.7	± 7.2	- 2.2	- 1.1	- 4.7	± 5.1	17.1
Bon Espoir ...	+ 7.2*	0.6	+ 0.4	± 2.1	- 2.4	- 1.7	+ 1.9	± 3.6	+ 0.1	+ 0.4	- 0.8	± 2.6	13.2
3RD RATOONS :													
Britannia ...	+ 7.0*	+ 1.8	+ 0.9	± 2.2	- 2.9	- 5.2	+ 1.3	± 3.8	- 2.5	+ 0.8	+ 0.3	± 2.7	8.0
Bénarès ...	+ 5.8*	+ 0.1	- 0.2	± 2.6	- 7.2*	- 1.3	- 2.1	± 4.5	- 1.7	- 1.6	+ 0.8	± 3.1	9.2
Savinia ...	+ 4.5*	+ 3.2	+ 2.5	± 3.9	- 3.5	+ 4.1	- 1.6	± 6.7	+ 6.7*	+ 1.6	+ 0.2	± 4.7	12.7
Richen Eau ...	+ 11.3*	- 3.1	+ 2.0	± 6.1	- 7.9	- 2.6	+ 2.6	± 10.6	- 0.6	- 6.0	+ 3.4	± 7.5	18.3
Beau Vallon ...	+ 12.7*	- 0.3	- 1.3	± 2.4	- 3.5	+ 0.1	- 1.1	± 4.1	+ 0.4	- 0.4	- 0.7	± 2.9	10.5
Union Flacq ...	+ 6.8*	- 0.4	+ 4.1*	± 3.5	- 0.3	- 3.3	+ 2.2	± 6.0	+ 1.5	- 0.4	- 0.1	± 4.2	13.6
Savannah ...	+ 8.0*	+ 1.8	+ 0.7	± 4.6	- 5.9	- 0.2	+ 2.5	± 8.0	+ 1.3	+ 2.0	- 0.8	± 5.7	16.6
Mont Choisy ...	+ 7.0*	+ 0.4	- 0.7	+ 1.8	- 6.0*	- 0.2	+ 0.2	± 3.2	+ 1.3	- 0.5	+ 1.7	± 2.2	10.6
Pierre fonds ...	+ 13.7*	- 1.2	+ 2.8	± 4.2	- 4.5	- 2.9	+ 0.1	± 7.2	- 0.2	+ 0.4	- 0.9	± 5.1	11.5
Rosé Belle ...	+ 6.5*	+ 7.0*	+ 1.4	± 3.5	- 1.1	+ 0.2	- 1.1	± 6.1/	+ 3.0	- 2.2	- 2.7	± 4.3	12.4
Deep River ...	+ 8.2*	- 0.7	+ 0.8	± 1.8	- 2.7	- 0.6	+ 3.0	± 3.1	+ 1.1	- 3.3	- 0.6	± 2.2	6.2
Henrietta ...	+ 9.7*	+ 3.7	- 0.6	± 4.6	- 5.7	+ 5.1	+ 1.2	± 7.8	- 3.3	+ 2.6	- 0.7	± 5.6	19.5
Beau Champ ...	+ 10.5*	- 2.7	+ 2.0	± 4.3	- 4.5	- 0.7	+ 5.8	± 7.4	0	- 1.7	- 3.3	± 5.2	15.3
GENERAL AVERAGE ...	+ 8.8	+ 0.6	+ 1.4		- 4.2	- 0.6	+ 1.0		+ 0.3	- 0.6	- 0.6		13.0

*Significant.

- (1) Linear response is the difference in yield between the double dose and the zero dose.
- (2) Curvature is the difference in yield between the double dose and medium dose minus the difference between the medium dose and the zero dose.
- (3) The interactions are only of the first order, i.e., between each pair of nutrients applied.

As it will be seen from the above tables, the response to Nitrogen fertilization is very high and amounts to 8.8 tons of cane per arpent.

Reference to previous reports of the Station will show that responses to Phosphate and Potash have been slowly but steadily increasing since the virgins.

As far as Phosphate is concerned, the trial at Rôse Belle S.E. has, this year again, given a significant response to applications of this fertilizer. In the two previous crops, however, the response to P_2O_5 , although very high, yet failed to reach significance. If the four crops are considered together, the average response to phosphate, in this trial, amounts to 5.3 tons of cane per crop, a figure which is certainly significant.

The mean response to Potash, for the series, is 1.4 tons of cane and this is the highest average figure recorded for the four crops.

One trial shows a definite response to Potash and many others show responses which, though not significant, are, nevertheless, very suggestive.

When the whole series is taken collectively, there is no appreciable interaction between any of the three elements.

One trial at Savinia shows a significant positive NP interaction. The negative NK interaction obtained at Riche en Eau for the last three years, is still apparent this year, though this time it did not reach significance.

Residual Effect of Pen Manure

This NPK series furnishes data from which some information can be obtained regarding the effect of pen manure.

Six of these trials were planted without pen manure and the remainder received, on the average, about 6 tons of pen manure per arpent.

If figures are considered for the four crops, the following means are obtained:—

	Tons cane per arpent		
	ON	1 N	2 N
Planting with 6 tons pen manure per arpent	26.2	31.5	32.2
Planting with no pen manure	23.6	31.4	33.2

The figures for the trials planted with pen manure are averages of 34 experiments and those planted without pen manure are averages of 21 experiments.

The above figures tend to show that planting with pen manure only affects the poorer plots, viz., those receiving no nitrogenous fertilization, and that it is only in these plots that the residual effect of pen manure is evident.

The Vegetative Growth Index

The Vegetative Growth Index has already been described in previous reports of the Station and its merits, scope and limitations discussed at length.

It is generally accepted that this index, which consists in taking the weight of 30 leaves of 3rd rank collected at random from each plot of the trial, will show the same trend as the actual weight of canes at harvest ; and that, further, it is more precise, for errors that may be caused by lodging of canes, and damage by rats, are completely avoided. For these reasons, this index is valuable in experimentation, as it gives a better idea of the effect of the variable factor which is being sought.

Table I shows once more the high degree of correlation existing between the Vegetative Growth Index and actual yield. It is suggested that planters who would like to have their own bit of experimentation might use this index instead of going through the tedious task of controlled harvesting and weighing of each plot separately. This would mean a saving of time, money and labour, while the results would be as accurate and would be obtained in a much shorter time.

Experimentators on estates however, should not forget that the Vegetative Growth Index is only applicable to differential fertilizer treatments to canes of the same variety planted in the same field and having the same age.

It must also be stressed that though the degree of correlation between vegetative growth and yield be very high, yet for responses to Nitrogen, the economic limit should be borne in mind ; for large applications of Nitrogen, while causing an increase in leaf development as well as in cane yield, may not give a corresponding increase in sugar produced.

Foliar Diagnosis

It was expected last year, that it would be possible for this division to change over from methods of analysis now in use, to more modern methods, using photo electric colorimeters. Chemicals and new equipment were ordered accordingly, but unfortunately up to the time of writing the chemicals had not been received. Therefore no analytical work in connection with foliar diagnosis could be done.

Samples of leaf punches were collected from all field trials as usual and will be analysed as soon as possible.

Leaf punches were also collected in the variety trials of the Cane Breeding Division in order to compare the newer varieties with the standard, M.134/32. The new varieties sampled include M.165/38, M.63/39, M.76/39, M.213/40 and M.423/41.

Lime Trials

This series consists of five trials distributed in the humid and superhumid zones of the island.

The layout adopted is a $3 \times 3 \times 3$ factorial experiment with every combination of Lime, Potash and Magnesia, at three levels each.

The quantities applied per arpent are given below:—

	0	1	2	
Lime ...	nil	1½ tons	3 tons	as Slaked lime
Potash ...	nil	75 kgs.	150 kgs.	as Muriate of Potash
Magnesia ...	nil	25 kgs	50 kgs.	as Magnesium Sulphate

It was thought advisable not to use the full quantity of lime that would neutralize the acid condition of these soils, as that quantity would differ for each trial, but to use instead smaller and equivalent quantities of lime for every trial.

The lime was spread by hand evenly in the furrows as well as on the interlines

The basic fertilization was the same as that usually practised on the estate where the particular trial was located.

All the trials were planted with M.134/32 and were harvested after 14 months.

Table III gives the results of this series of experiments.

TABLE III

TABULATED RESULTS OF LIME TRIALS ON ESTATES (1949)

Comparative yield of millable cane

Locality	Lime			Potash			Magnesia		
	O Ca (a)	1 Ca	2 Ca	OK (a)	1 K	2 K	O Mg (a)	1 Mg	2 Mg
Riche Bois ...	100 (30·7)	101	100	100 (29·5)	101	111	100 (32·1)	94	94
Bénarès ...	100 (27·2)	98	97	100 (26·3)	105	100	100 (28·1)	88	97
Union Flacq ...	100 (34·0)	99	104	100 (35·3)	98	95	100 (35·3)	99	93
Henrietta ...	100 (16·2)	96	98	100 (13·2)	124	139	100 (17·0)	94	89
Olivia ...	100 (16·3)	102	95	100 (16·5)	95	99	100 (15·3)	105	112
Gen-Average ...	24·9	24·8	24·8	24·2	24·8	25·4	25·6	24·4	24·5
Comp. Yield ...	100	99	99	100	102	105	100	95	96
Index of Veg. Growth...	100	99	99	100	103	105	100	99	97

(a) Actual yield in tons cane per arpent, represented by 100, is given in brackets.

RESULTS OF STATISTICAL ANALYSIS OF LIME TRIALS

Linear Response

Locality	Ca	K	Mg	Sig: diff: 20 : 1
Riche Bois ...	0	+ 3·2*	- 1·9	± 3·1
Bénarès ...	- 0·9	0	- 0·9	± 3·1
Union Flacq ...	+ 1·5	- 1·9	- 2·5	± 3·6
Henrietta ...	- 0·2	+ 5·1*	- 1·9	± 2·7
Olivia ...	- 0·8	0	+ 1·8	± 3·1

These virgin canes do not show, on the average, any response to either Lime or Magnesia, but two trials out of five show a significant response to Potash application, the average for the whole series being a 5 per cent increase in yield due to Potash.

* Significant.

At harvest composite samples of cane were taken from these trials and analysed for sugar. These yielded the following average results:—

	<i>Lime</i>			<i>Potash</i>			<i>Magnesia</i>		
	0	1	2	0	1	2	0	1	2
C.C.S. per cent cane ...	14.4	14.5	14.1	14.4	14.5	14.8	14.3	14.2	14.2
Tons C.C.S. per arpent ...	3.59	3.60	3.50	3.48	3.60	3.76	3.64	3.49	3.48

The results of this series of lime trials are only presented here, but no attempt will be made to interpret them, as the data collected are not sufficient to enable definite conclusions to be arrived at.

This series is being continued in ratoons.

Effect of differential fertilization on Sugar Content of Sugar Cane

As usual, composite samples of cane were taken from the factorial NPK experiments and analysed for sugar.

The summarized data for all the trials are presented below:—

	<i>Nitrogen</i>			<i>Phosphoric Acid</i>			<i>Potash</i>		
	0	1	2	0	1	2	0	1	2
C.C.S. percent									
cane (1949) ...	14.17	14.12	13.88	13.77	14.18	14.04	13.87	14.08	13.82
Tons sugar per arpent ...	3.05	3.04	4.19	3.59	3.79	3.75	3.61	3.69	3.79

Once more the application of Nitrogen has resulted in an increase in yield of sugar per arpent. The increase produced by the supplementary dose of Nitrogen is probably not economic.

The following figures show the effect of Nitrogen, Phosphate and Potash on the sugar content of sugarcane. These figures are averages for the four crops and represent therefore about seventy experiments—

COMMERCIAL CANE SUGAR % CANE

	<i>Nitrogen</i>	<i>Phosphoric Acid</i>	<i>Potash</i>
0 ...	12.61	12.32	12.23
1 ...	12.46	12.51	12.39
2 ...	12.22	12.51	12.29

From the above figures it can be safely concluded that increased applications of Nitrogen will cause a decrease in the sugar content of sugarcane.

The corresponding figures for Potash do not show any effect on the sugar content, whilst those for Phosphate suggest a higher sugar content with high Phosphate fertilization.

Permanent Trials at Central Experiment Station

Bio 5. The object of this trial is to compare the effect, on sugarcane yield, of a complete fertilization to that of withholding Phosphate and Potash.

This trial is under the variety M.112/34 and was harvested in 5th ratoons.

The results for this crop, together with the average figures for the virgin and the five ratoon crops, are given hereunder:—

TONS CANE PER ARPENT

	<i>Complete</i>	<i>Minus K</i>	<i>Minus P</i>
5th ratoons (1949) ...	26.5	17.4	21.0
Average of 6 crops ...	31.7	21.6	24.1

Results from this trial show that application of Potash has resulted in an average increase in yield of 10.1 tons of cane per crop for six crops, and that application of Phosphate has shown a gain of 7.6 tons of cane per crop during the same period.

These —K and —P plots represent, in fact, fields which have received no Potash or Phosphate fertilization for years, cases which are often met with, especially in small planters' lands.

This trial will be uprooted after harvest of the sixth ratoon crop and replanted with M.423/41, so that deficiency symptoms may be studied on this variety.

Investigations on the Fertilizing Value of Crushed Basaltic Rock

In the 1947 annual report of the Botanical Division of the Station, mention was made of investigations in connection with the value of crushed basalt when applied to the soils of the high rainfall regions of the island.

These lateritic soils are derived from the decomposition *in situ* of basalt, a rock rich in plant food. The soil forming factors are so intense in these regions that the basalt has completely altered to a very deep soil from which most of the silica and bases have been removed through leaching. All that remains is a very poor acid residue characterised by numerous sesquioxides concretions and devoid of most of the fertility elements.

The first investigations were started many years ago by M. O. d'Hotman de Villiers, who thought to rejuvenate these exhausted soils by bringing back to them the rich parent material from which they were first formed. The basalt was crushed to small particles before use, so as to expose as great a surface as possible to the weathering agents. As very encouraging results were obtained, it was decided that the Station should investigate the matter fully.

An experiment was therefore started at Hermitage S.E. in 1947, on a 3×2×2 lay out with 3 levels of crushed basalt, two varieties and two levels of fertilization.

At the same time a series of pot culture experiments was carried out with the same soil. The description and results of these experiments were given in the report of the Botanical Division for 1947.

This series of investigations is now being continued by the Chemical Division.

These experiments, however, were conducted mainly on the soil of Hermitage and although positive results were obtained through the use of crushed basalt on this particular type of soil, yet no information was available as to the extent to which other soil types will respond to basalt applications.

For this, and other reasons, a new series of pot experiments was started on 3 different soils obtained from Ebene, Mon Désert and Cascade.

These soils are all mature soils showing different degrees of laterization corresponding to the rainfall intensity. Laterization as well as rainfall, is highest at Cascade and lowest at Ebene. Fertility, on the other hand, varies inversely as rainfall, being highest at Ebene and lowest at Cascade. Mon Désert is the intermediate type.

Another reason for initiating this new series of pot experiments was the necessity to find out which of the constituents of basalt is responsible for the increase in yield which follows an application of the crushed rock.

Each of the three soils selected was divided into 7 pots which received the following treatments—

- A—Soil alone
- B—Soil + Si + Mg + Ca + K (Complete)
- C—As B but minus Si (—Si)
- D—As B but minus Mg (—Mg)
- E—As B but minus Ca (—Ca)
- F—As B but minus K (—K)
- G—As A plus basalt at 200 tons per arpent.

Nitrogen and Phosphate were applied uniformly to every pot.

The first experiment was planted with a dwarf type of Sorghum (variety Bonita) but on account of non-uniformity in germination no striking results were obtained apart from the fact that a bigger yield was evident in the basalt plots.

Another series is being started on the same pots with oats as test plant.

This division has also under its control now, another basalt field experiment at Belle Rive S.E. which had been laid down many years ago by Mr. O. d'Hotman. This is the third rotation of the 4 × 4 latin square which provided most of the results presented at the origin of the investigations on basalt. The amounts of basalt used in this rotation are nil, 60 tons, 120 tons and 350 tons per arpent.

Hermitage Basalt Trial. The 3 × 2 × 2 basalt experiment at Hermitage was harvested this year in 1st ratoons, and yielded the following data:—

	<i>Tons cane per arpent</i>	<i>Comparative Yield</i>
OB—No basalt	26.7	100
1B—91 tons basalt per arpent ...	29.8	111.6
2B—182 tons basalt per arpent ...	32.5	121.7
Significant difference (20: 1) ...	± 2.9	

The above figures show that applications of basalt at 91 tons and 182 tons per arpent have yielded respectively 3.1 tons and 5.8 tons of cane more than the control. When the figures are analysed statistically, these differences are shown to be significant. The difference between the double dose and the single dose, though fairly high, is however not significant.

The following figures give the yield produced by the different varieties and by the two levels of fertilization:—

			Tons cane per arpent				Tons cane per arpent
M. 134/32	...	...	27.8	Estate fertilization	...	...	28.2
M. 63/39	...	...	31.5	Double estate fertilization	...	...	31.1
Significant difference (20:1)	...	...	± 2.4	Significant difference (20:1)	...	...	± 2.4

These figures show that M.63/39 has outyielded M.134/32 by 3.7 tons and that the double estate fertilization produced 2.9 tons of cane more than the single one, both differences being significant.

The differential response of the two varieties to applications of basalt is given below for the virgin and the 1st ratoon crops:—

TONS OF CANE PER ARPENT

		M. 134/32			M. 63/39		
		0B	1B	2B	0B	1B	2B
Virgins (1948)	...	26.5	26.6	30.1	37.2	40.5	42.4
1st Ratoons (1949)	...	24.7	28.4	30.3	28.7	31.2	34.8

The response to basalt in virgins, though evident, was nevertheless masked to a certain extent by the abnormally high fertilization the virgin crop had received.

The corresponding figures for sugar extracted are given below—

COMMERCIAL CANE % SUGAR CANE

		M. 134/32			M. 63/39		
		0B	1B	2B	0B	1B	2B
Virgins	...	10.9	11.2	11.1	9.3	8.7	8.2
1st Ratoons	...	11.7	12.3	11.9	11.4	12.0	12.1
Average	...	11.30	11.75	11.50	10.35	10.35	10.15

When the differential response of the different fertilizations to applications of basalt is determined, in terms of C.C.S., the following figures are obtained—

		Single Fertilization				Double Fertilization			
		0B	1B	2B	Mean	0B	1B	2B	Mean
Virgins	...	10.10	10.80	10.00	10.3	10.20	10.15	9.30	9.9
1st ratoons	...	12.15	12.55	12.85	12.5	10.90	11.70	11.15	11.3

Reference to the above table shows the detrimental effect of the double or high fertilization on the sugar content. It is not surprising therefore to see the rather erratic figures derived from the single fertilization in virgin, which single fertilization was, in fact, as already mentioned, *abnormally high*.

On the other hand the single fertilization of the ratoons was much more in accord with the general estate practice and it is worthy to note that, in this case, the application of basalt has resulted in an increase in the sugar content.

It is interesting to recall, in this connection, that in the first investigations with basalt at Belle Rive S.E., an increase in sugar content was also observed, but from the 2nd ratoons.

Conclusions. It may be inferred from the results obtained so far, that a definite advantage is obtained whenever crushed basalt is applied to the poor soils of the high rainfall regions.

If the experiments in hand fail to indicate which of the constituents of basalt is responsible for the increase in yield following an application of the crushed rock, but show, on the other hand, that this advantage is derived from some property of basalt itself, which is outside the limits of control, then the use of basalt may prove interesting in spite of the high cost of manipulation of the large amounts required. For it must be realized that crushed basalt will continue to exert its beneficial effect as long as there remain, in the soil unaltered particles of the rock.

Even if the cost of application is only repaid after many years, it will still be worth while, for, apart from increasing the productivity of these poor cane soils, the use of basalt might also allow large areas of the Crown lands, now unproductive, to be brought under successful cultivation.

SYDNEY M. FEILLAFÉ,

Acting Chemist.

PART III—BOTANICAL DIVISION

During the year under review, the Division had still to work at reduced strength. Mr. B. Nundloll was appointed Assistant Field Officer in charge of Cultural Methods as from the 3rd of May and assumed duty on that date. This officer was attached to the Division with a view to assisting in the carrying out of experimental work on secondary crops.

Apart from the research work of the Division, the present writer lectured in Botany at the Mauritius College of Agriculture from May to October and also delivered a series of comprehensive talks on Elementary Botany and on Chemical Weed Control to the Field Demonstrators.

Weed Control

Experimental work on weed control was directed during the year mainly on weed species not hitherto investigated. The so-called "resistant weed species" were, however, not overlooked and investigations were continued so as to evolve better methods of control for their eradication. Comparative experiments were also laid down with a view to assessing the herbicidal value of new hormone-type of weed killers relatively to liquid Agroxone.

Information relative to the investigations carried out in that direction, is given below under the specific name of the individual weed species,

Acanthaceae

Barleria Prionitis—(Piquant tac-tac)

This plant is a low much branched shrubby perennial bearing yellow flowers. Beset with spreading spines in the axils of the leaves, it is a really objectionable weed wherever it occurs. Its eradication by hand labour is so difficult that to get rid of it fire is often resorted to. It is a fairly common weed of the coastal regions; though its presence in other localities is not uncommon. In Rodrigues, where it makes luxuriant growth under the shade of *Leucaena glauca* plants (Acacia) on the slopes around Oyster Bay, it proves also to be a very troublesome weed.

The plant is fairly resistant to liquid Agroxone. Sprayed at 0.30 per cent concentration, it suffered from a severe defoliation, following which a die-back of the shoots through about one half of their length occurred. New buds, however, emerge from the base of the stems at a later stage and normal growth ensues.

The method of control which was found to give the most satisfactory results was a spraying with an aqueous solution of Sodium chlorate at 10 per cent concentration. A complete kill of the plant was obtained with a single application of the chemical.

Zygophyllaceae

Tribulus terrestris—(Piquant tricolore, Puncture vine)

This annual has always been classed as a very bad weed wherever it occurs. It thrives well in the drier localities of the island and is a common weed species of the coastal regions of Black River district. The plant branches freely at the crown of the root and sends out trailing stems which make rapid growth and soon cover the ground with a dense vegetation. It is further characterised by its small delicate yellow flowers and its numerous harmful fruits. These are developed all along the spreading stems and when mature, break into small fruit parts, each beset with two sharp rigid spines.

These fruit parts are easily detached and lie scattered over the ground with always one point upwards.

The best way of controlling this vine was found to be an aqueous solution of Sodium chlorate at 10 per cent concentration. As the weed matures quickly, young plants flowering a fortnight or so after germination, when conditions are favourable, a more effective control is obtained when the plants are sprayed before the setting of seeds.

Compositae

Tithonia diversifolia—(Petite fleur soleil; Mexican sunflower)

This plant, cultivated in the island for ornamental purposes, is now spreading so rapidly by its fairly large output of fertile seeds that it is becoming a really noxious weed. It is a much branched perennial growing to a height of 5-8 feet. Although its flower heads, with their outer whorl of bright yellow florets, recall those of the true sunflower, *Helianthus annuus*, yet the two plants are different in many other respects.

Comparative tests were carried out with liquid Agroxone and Fernoxone (80 per cent Sodium 2, 4-D) at 0.20 and 0.30 per cent concentrations and with Sodium chlorate at 10 per cent concentration. Fernoxone and liquid Agroxone at the above dosages gave no satisfactory results, though the Fernoxone treatment at 0.30 per cent was found better than the Agroxone one at equivalent concentration of active content. The Sodium chlorate method was found to be the best treatment. Plants of moderate size were killed completely in most cases with a single application of the chemical. Large sized plants, however, resisted fairly well. Although their shoots died completely, down to their point of attachment to the main stem, yet new buds emerge at the base of the plant. The new shoots produced were drawn out and developed pallid green leaves showing well marked interveinal chlorosis. At a later stage, however, normal green shoots were produced.

Spraying with Sodium chlorate remains the most effective method of destroying this plant. It must be emphasized, however, that success depends largely on the relative size of the plants that are sprayed.

Solanaceae

Solanum auriculatum—(Tabac marron)

This shrubby perennial, of vigorous growth, is a weed of common occurrence in the drier parts of the island. It may be recognised easily by its massive inflorescence of violet flowers and its characteristic yellow berries. The plant is fairly resistant to Fernoxone (80 per cent Sodium 2, 4-D) at concentrations from 0.10 to 0.30 per cent. At the highest concentration, although the berries turned black and rot and a severe defoliation occurred, yet the plants recovered fairly well, producing new buds at the base of the stem. A 5 per cent aqueous solution of Sodium chlorate gave no better results apart from a general scorching of the leaves.

An effective way of controlling this weed is, at present, not available and further investigation, in that direction, is being continued.

Gramineae

Axonopus affinis—(Gazon anglais)

This grass, though not a very bad weed, causes some trouble, at times, in the wet localities of the island. It is a perennial, that extends itself rapidly by its rhizome and its many noded leafy stolons. A single application of an aqueous solution of Sodium chlorate at 10 per cent concentration was found to give a good control of the weed.

Dactyloctenium aegyptium—(Chiendent patte de poule)

This annual is a common grass of the coastal regions. It is known as "chiendent patte de poule", a local name which it shares with another grass species *Eleusine indica*. It propagates profusely by means of its fairly large output of fertile seeds. In association with other grasses and broad-leaved annuals, it spreads so rapidly that often it becomes the dominant species in a relatively short time.

At 10 per cent concentration of Sodium chlorate in aqueous solution, the grass is fairly resistant at the seedling stage. Its resistance, however, decreases from the flowering to the seedling stage and a fairly good control is then obtained when sprayed at that time. As this grass is an annual a late spray might then not prove economical. Germination tests are therefore contemplated so as to determine whether sprayed seeds retain their vitality as non sprayed ones, or whether they are killed by the chlorate spray. All data that would be obtained in this connection would then serve to point out the most economical way of eradicating this weed.

Cynodon Dactylon—(Chiendent)

An experiment was started early in March, with a view to determining whether it would not be more economical to control "chiendent" at the Tobacco Research Station by using a weed-killer instead of employing hand labour.

A patch of land was then selected in a field of the Station, where chiendent was most abundant and showed luxuriant growth. It was conveniently divided into five plots and each received the treatment as shown below:—

1. Sodium chlorate at 10 per cent concentration in aqueous solution
2. Sodium chlorate at 15 per cent concentration in aqueous solution
3. Ammonium sulphamate at 10 per cent concentration in aqueous solution
4. Ammonium sulphamate at 15 per cent concentration in aqueous solution
5. Control chiendent completely removed from plot by hand labour.

Observations made in May showed that in the Ammonium sulphamate plots new growth had begun. By June, resumption in the activity of the chiendent had occurred in both of these plots and no great difference could be made between the 10 per cent and 15 per cent treatments. In the plots treated with Sodium chlorate, the 15 per cent treatment was by far the best one. Observations made in June showed not a single regrowth in that plot whereas a few foci of regrowths had begun in the 10 per cent treated plot. In the control plot, the regrowth incidence in June was comparatively similar to that occurring in the 10 per cent Sodium chlorate one.

In late July, parts of the plots treated with 10 per cent and 15 per cent Sodium chlorate were dug out so as to determine the depth at which death of the rhizomes had occurred. The soil was removed with care and all the rhizomes dug out carefully examined. In the 15 per cent treated plots, as far as could be ascertained, no living rhizomes were found in the topsoil to a depth of about 15-18 inches. Further digging to a depth of 3-4 inches in the subsoil failed also to reveal the presence of living rhizomes. In the 10 per cent treated plots, living rhizomes occurred occasionally both in the topsoil and subsoil layers.

In order to test whether a residual effect of the chlorate existed, White Burley tobacco seedlings were planted in July on the undisturbed parts of these treated plots; although the season was practically over, yet the tobacco plants made good growth and showed no symptoms of chlorate toxicity.

These preliminary observations are stimulating in so far that they showed that an application of 15 per cent Sodium chlorate might give a good control of chiendent under conditions prevailing at the Tobacco Research Station at Richelieu. The cost of the chemical and its application lies between Rs. 150—Rs. 175 per arpent whereas the digging out of chiendent by hand labour from a similar area amounted to Rs. 800—Rs. 1,500.

The difference in cost between these two methods of controlling chiendent is, no doubt, highly appreciable. It would not, however, be safe to do away with the methods now employed to get rid of this weed there, at present, for further information is of utmost importance before it is possible to assess the real value of the Sodium chlorate method.

I am indebted to the Senior Research Assistant of the Tobacco Research Station for his valuable assistance in carrying out these investigations at the Tobacco Research Station.

Test on New Hormone-Type of Weed Killers

The two products tested were:—

Fernoxone : a dispersible powder concentrate containing 80 per cent Sodium, 2, 4-D dichloro-phenoxyacetate (2, 4-D) as active ingredient, plus a dispersing agent. A product of Plant Protection Ltd

Raphone liquid : an hormone type of weed killer supplied by Schering Ltd.

Evaluation of the herbicidal properties of these two new products was determined in comparison with those of liquid Agroxone. The results obtained are given below under the specific name of the individual weed species.

Hydrocotyle bonariensis—(Herbe bol)

A series of experiments was laid down at the Plaines Wilhems Experimental Station with Fernoxone, liquid Agroxone and Raphone liquid at concentrations of 0.10, 0.15, 0.20, 0.25, 0.30 per cent in aqueous solution. On the land selected for the experimentation “ Herbe bol ” was the dominant species and had made luxuriant growth. Other weed species that occurred in all the plots and which might be worth mentioning were *Ageratum conyzoides* (Herbe de bouc) and *Hydrocotyle asiatica* (Herbe boileau).

The main difference between the results of the treatments was that the characteristic yellowing of the leaves which normally followed an hormone spray on this weed species, occurred much more quickly after the time of application with Agroxone than with either Fernoxone or Raphone liquid. It must be emphasized, however, that this more rapid change of colour in the leaves of Herbe bol, after the Agroxone treatment is misleading ; for final observations showed that no great difference could be made in the net toxic effect of the three weed killers at equivalent concentrations of active content. As it might have been expected, regrowth incidence was in all these experiments, closely related to the concentration of the herbicide.

It may be further stated that “ Herbe de bouc ” and “ Herbe boileau ” were also affected to the same extent by the three weed killers.

Ambrosia artemisifolia—(Herbe solférino)

Raphone liquid not being available, experiments on this weed species were carried out with Fernoxone and liquid Agroxone at 0.20, 0.25 and 0.30 per cent concentration in aqueous solution. From the observations made, it was established that although Fernoxone acted much more quickly on this weed species than Agroxone at equivalent concentration, yet the net toxic effect was comparatively similar after both treatments. At the 0.20 per cent concentration there was no great difference in the amount of regrowth and at 0.30 per cent concentration complete control was obtained with both of the weed killers.

Lantana camara—(Vieille fille)

Fernoxone and Agroxone at 0.30 and 0.50 per cent concentration in aqueous solution were sprayed on the pink and orange varieties respectively. The Fernoxone treatment was found also to act much more quickly than the Agroxone one, but this superiority was found to be only apparent, for regrowth incidence occurred comparatively to the same extent after both treatments.

Solanum indicum—(Bringelle marron ; Petite anghive)

On this weed species Fernoxone was found to be superior to Agroxone. At 0.10 and 0.20 per cent concentration, plants of medium size were killed completely with Fernoxone whereas plants of approximately the same size resisted fairly well to Agroxone at equivalent concentration. Although the Agroxone treated plants suffered greatly from the action of this herbicide, yet buds given at the base of the stem developed into normal green shoots.

Conclusion

It may be inferred from the above experiments that Fernoxone, Raphone liquid and Agroxone liquid have proved of equal value in their herbicidal properties on "Herbe bol". On the other weed species, apart from a marked selectivity on *Solanum indicum* (petite anghive), no great difference could be observed between the Agroxone and Fernoxone treatments. It must be emphasized, therefore, that the use of these different hormone-types of weed killers, in practice, should be governed mainly by the relative cost of the product.

Pre-emergence Control Investigation

An experiment was laid down at the Plaines Wilhems Experimental Station in September so as to obtain some information on the pre-emergence control of weeds in sugarcane land. It consisted of four treatments: liquid Agroxone at three concentrations and a control one.

A piece of land was weeded out with the hoe and furrows laid down 3 feet apart. Sugarcane setts with three eyes each, pretreated in an organo-mercurial disinfectant were then planted and covered with 1-2 inches of soil.

The individual plots were then sprayed with liquid Agroxone at 0.20, 0.25 and 0.30 per cent concentration in aqueous solution, at the rate of 100 gallons per arpent.

It was found necessary to make a count of the weed population two months after the spray, that is, one month earlier than it had been contemplated. The annual weeds occurring in the control plots having reached the seeding stage earlier than those present in the treated plots, were rapidly dispersing their seeds. As a result, seedlings of the new generation were making good establishment and would have rendered a weed count difficult, if not impossible, in these plots at a later stage.

The results obtained are given below and for convenience the weed species have been grouped according to their degree of susceptibility to Liquid Agroxone as: very susceptible, susceptible, fairly resistant and resistant.

<i>Total No. of weed species per treatment</i>				
<i>Controls</i>		<i>Treatment</i>	<i>Treatment</i>	<i>Treatment</i>
		<i>0.20</i>	<i>0.25</i>	<i>0.30</i>
		<i>per cent</i>	<i>per cent</i>	<i>per cent</i>
		<i>conc.</i>	<i>conc.</i>	<i>conc.</i>
Very susceptible	... 236	109	109	64
Susceptible	... 214	65	47	58
Fairly resistant	... 100	68	92	103
Resistant	... 100	92	127	58
TOTAL	... 650	334	375	283

Further if the degree of infestation be expressed in terms of percentage reduction of the weed population the following figures are obtained:—

<i>Agroxone</i>	
<i>per cent</i>	<i>per cent</i>
<i>Concentration</i>	<i>Reduction</i>
0.20	48.6
0.25	42.3
0.30	56.5

As it may be observed from the above data, the reduction in the weed population gave an appreciable figure which might be roughly estimated at 50 per cent in the treatment plots.

It is further interesting to note that, but for the presence of these fairly resistant and resistant weed species consisting mostly of sedges and grasses, the percentage reduction in the weed population would have reached a figure of about 65–70 per cent in the treated plots.

It may also be worth mentioning that a count made of the number of germinated buds gave the following results:—

		<i>No. of</i>	
		<i>germinated buds</i>	
Controls		...	452
Agroxone at 0.20 per cent conc.	...	...	453
Agroxone at 0.25 per cent conc.	...	...	463
Agroxone at 0.30 per cent conc.	...	...	487

The above data show that the germinative capacity of the buds was not affected by the hormone spray and that even a small increase, in that direction, was obtained.

Conclusion

This preliminary work on pre-emergence control of weeds, though highly encouraging is, evidently not sufficient, to warrant its application in practice. For this method of control to become a really effective one, the selective weed killer used should also inhibit the growth of these resistant weed species through a period not less than 3-6 months. The canes would then have reached a stage of growth when they would naturally keep in check the weed population of the interlines.

In the wet localities, where the broad-leaved weed species are dominant at certain times of the year, pre-emergence spray, if properly planned out, might perhaps give very good results. It should be emphasized, however, that even then, the cost of the material and the necessity of employing large volumes of water might possibly prove to be important limiting factors.

Further work on pre-emergence weed control is being planned out for the future in the light of new developments achieved in that direction. The use of sprayers fitted with low volume nozzles where the volume of spraying liquid is thereby reduced from 100 to about 25 gallons per arpent might contribute, perhaps, to solve at least some of our weed problems.

Root Pruning as a test to *Clemora Smithi* Resistance

A root pruning test based on the method evolved by Dr. H. Evans in 1937-1938, was carried out, with a view to assessing the resistance of the new sugarcane seedlings M.213/40 and M.423/41 relatively to M.134/32 to the eating action of grubs of *Clemora Smithi*. Briefly the method consists in uprooting a stool of canes, making a count for the number of white roots for each cane. All the roots are then pruned off, and the canes placed in moist sawdust in a sheltered situation and watered twice daily. Counts of the young roots that have emerged from the root primordia are then made at two fortnightly intervals.

The results showed the following data:—

Category	Variety	Average No. of white roots per cane			
		Before pruning	After 1st pruning	After 2nd pruning	After 1st and 2nd prunings
VIRGINS	... M. 134/32	... 5.7	12.7	2.9	15.6
"	... M. 423/41	... 9.3	15.7	4.0	19.7
"	... M. 213/40	... 10.2	18.8	2.0	20.8
1ST RATOONS	... M. 134/32	... 4.1	9.1	15.3	24.4
"	... M. 432/41	... 6.6	11.2	9.2	20.4
"	... M. 213/40	... 5.6	10.0	13.8	23.8
2ND RATOONS	... M. 134/32	... 4.7	11.0	4.5	15.5
"	... M. 423/41	... 7.9	10.8	7.5	18.3
"	... M. 213/40	... 1.7	10.1	4.1	14.2

From the above table, the following figures may be obtained:—

				Total No. of white roots per cane that emerge after pruning		
				M. 134/32	M. 423/41	M. 213/40
Virgins ...	...	...	...	15.6	19.7	20.8
1st ratoons ...	...	...	...	24.4	20.4	23.8
2nd ratoons ...	...	...	...	15.5	18.3	14.2
TOTAL ...	...	...	...	55.5	58.4	58.8

The above data show that the resistance of the three varieties to the eating action of the grubs gave comparatively similar results. It must be stated, however, that owing to staff shortage, the experiment was carried out on only a limited number of cane stools. The results so far obtained, although showing that these two new cane seedlings are as resistant to the eating action of the grubs of *Clemora Smithi* as M.134/32 is, yet, further data are required before it is possible to assess their respective resistance in that respect.

Field Trial on Accessory Fertilizers

The trial laid down in March 1948, at Olivia (Beau Champ S.E.) with the variety M.134/32 was harvested this year in virgins. It may be recalled that the aim in view was to obtain some information as to the effect of supplementing various elements on the yield and sucrose content of cane grown on the poor leached soils of the wet districts.

The lay out was a 6×6 Latin square and the elements supplemented consisted of Magnesium, Potassium and the trace elements Zinc, Copper, Manganese and Boron.

Apart from a response in the treatment which received the complete set of elements mentioned above, no responses in yield of canes to extra potassium or to magnesium or to trace elements were obtained. Sucrose determinations also showed no response to the different treatments.

Pretreatment of Sugarcane Cuttings

TEST OF NEW SUBSTANCES

Aretan and Abavit S having given comparatively similar results in their use as sugarcane disinfectants in a trial made last year at Réduit, an experiment on similar lines was carried out this year with a view to obtaining further information in this direction. This experiment was laid down at Plaines Wilhems Experimental Station and consisted of 9 treatments in each of 8 randomized blocks.

The results obtained are summarised below:—

Treatments	No. of germinated cuttings per plot Max : No. 30	Total length of shoots per plot	No. of cuttings infected with pineapple disease per plot Max : No. 30
Controls ...	22	684	8
Aretan 1 per cent ...	22	690	7
Abavit S 1 per cent ...	25	82	3
Aretan $\frac{1}{2}$ per cent ...	24	855	6
Abavit S $\frac{1}{2}$ per cent ...	26	1002	4
Agrosan GN 1 per cent ...	25	828	5
Hortosan D.P. 1 per cent	23	722	8
R 1334 × 14 1 per cent ...	25	768	5
R 1104 × 51 1 per cent ...	24	831	6
Sig : Diff (P = 0.05) ...	± 2.3	± 57.7	± 1.8

From the results obtained, the following observations emerge:—

- (1) Abavit S at the lowest concentration was found to be the best treatment and gave a significant increase in the number of cuttings germinated, in the total length of shoots and in the pineapple disease incidence.
- (2) Aretan at the lowest concentration and Abavit S., Agrosan GN and R 1104×51 at the 1 per cent concentration gave comparatively similar results, except for pineapple disease incidence where Abavit S was found to be the best treatment.
- (3) Aretan and Hortosan D.P. at the one per cent concentration gave comparatively similar results to the controls both in the pineapple disease incidence and in the number of germinated cuttings and total length of shoots.
- (4) From the results so far obtained it is interesting to note that Abavit S this year has again compared favourably with Aretan both in its growth promoting capacity and in its fungicidal properties.

YIELD TRIALS

Three trials were this year laid down so as to obtain further information on the effect of sugarcane disinfectants on the increase of cane yield. Pineapple disease incidence was recorded when recruiting was made and the cuttings were pre-treated with the respective disinfectants before being planted in the missing holes.

These experiments have been conducted at Labourdonnais, Ferney and Bénarès sugar estates and will be harvested in 1950.

Investigations on Yield Effects of Interplanting Foodcrops with Sugarcane

Out of the six trials laid down in 1948, two were abandoned owing to the poor growth of the foodcrop plants and the four others were harvested this year. Further four new trials were also established during the year at Bénarès, Solitude, Mon Trésor and Rosalie respectively. These new trials are showing good growth until now and will be harvested in 1950.

As it was mentioned in the 1948 report, these trials have been conducted on the Latin square system of replication and all combinations, sugarcane alone, sugarcane interplanted with a crop in alternate interlines, and sugarcane interplanted with a crop in every interline have been used.

The main points that have been observed in the carrying out of these experiments are:—

- (1) Each foodcrop receives an adequate complete fertilization.
- (2) The same planting distance is maintained for each foodcrop in all the trials where it occurred.

The results so far obtained will be given below under the name of the estate on which the experiment was carried out.

BRITANNIA S.E.

Time of Planting sugarcane (Var. M.134/32): end of August 1948.

Time of Planting foodcrops : end of August 1948.

Foodcrops interplanted: maize, sweet potatoes.

Growth. The maize plants showed at first a slow growth, later they improved satisfactorily and made a rather fair establishment. Sweet potatoes grew fairly well.

Harvest. The canes were harvested in mid-October this year, that is, after about 13½ months growth; the results obtained showed the following data:—

<i>Treatment</i>	<i>yield in tons/ar p.</i>
1. Sugarcane alone	20.4
2. Sugarcane with maize in alternate interlines	16.9
3. Sugarcane with sweet potatoes in alternate interlines	15.4
4. Sugarcane with maize and sweet potatoes in every interline	13.3
Significant difference ($P=0.05$)	± 3.3

The foodcrops gave the following average yield per arpent:—

<i>Treatment</i>	<i>Yield in Kgs/arpent</i>	
	<i>Maize</i>	<i>Sweet potatoes</i>
2	290	—
3	—	1,250
4	250	1,000

FERNEY S.E.

Time of planting: sugarcane (Var. M.134/32): mid-September.

Time of planting: foodcrops : mid-October.

Foodrops interplanted: maize, groundnuts.

Growth. Maize plants made good growth in all the plots. Prior to harvest time, however, a certain amount of seeds were eaten, in the field, by birds and this evidently caused a reduction in the average yield of that crop. Groundnut seedlings suffered from the very beginning from a partial attack of hares which ate the tender foliage. Recruiting had to be done on more than one occasion and as a result, a large number of missing holes occurred in all the plots. It was then impossible to obtain figures for that crop in this trial.

Harvest. The canes were harvested at the beginning of December, that is, about 15 months after planting. The results obtained gave the following data:—

<i>Treatment</i>	<i>Yield in tons per arpent</i>
1. Sugarcane alone	32.5
2. Sugarcane with maize in alternate interlines	31.6
3. Sugarcane with groundnuts in alternate interlines	30.5
Significant difference ($P=0.05$)	± 6.3

The foodcrops gave the following average yield per arpent:—

	<i>Kgs. per arpent</i>	
Treatment 2	...	287
Treatment 3	...	not weighed

PLAINES WILHEMS EXPERIMENTAL STATION—TRIAL NO. 1

Time of planting: sugarcane (Var. M.423/41): end of September.

Time of planting: foodcrops : 2 days after.

Foodcrops interplanted: maize, potatoes.

Growth. Maize made a fair establishment. The potatoes were planted late in the season; they had then to be harvested earlier for the tubers had started new growth instead of maturing normally.

Harvest. The canes were harvested at the beginning of December after about 14 months growth. The results obtained are given below:—

<i>Treatment</i>	<i>Yield in tons per arpent</i>
1. Sugarcane alone	16.6
2. Sugarcane with maize in alternate interlines	10.9
3. Sugarcane with potatoes in alternate interlines	16.3
4. Sugarcane with maize and potatoes in every interline	11.8
Significant difference ($P=0.05$)	± 2.9

Average yields of foodcrops in Kgs., per arpent are given below:—

	<i>Maize</i>	<i>Potatoes</i>
Treatment 2	... 347	—
Treatment 3	... —	617
Treatment 4	... 437	571

PLAINES WILHEMS EXPERIMENTAL STATION—TRIAL NO. 2

Time of planting: sugarcane (Var. M.134/32): end October.

Time of planting: foodcrops : end October.

Foodcrop interplanted: eddoes.

Growth. The eddoes showed excellent growth.

Harvest. The canes were harvested at mid-November, after about 12 months growth. The results obtained showed the following data:—

<i>Treatment</i>	<i>Yield in tons arpent</i>
1. Sugarcane alone	19.9
2. Sugarcane with eddoes in alternate interlines	18.2
3. Sugarcane with eddoes in every interline	17.5
Significant difference ($P=0.5$)	± 4.3

Eddoes gave the following average yield per arpent:—

	<i>kgs.</i>
Treatment 2	 490
Treatment 3	 1300

Conclusion

It is at present too early to draw definite conclusions on the yield effects of interplanting foodcrops with sugarcane. In the light of the above results, however, some general observations might be made but these should be considered only tentative and therefore subject to revision when further data are obtained later on:—

- (a) Maize affected significantly cane yield in the trials laid down at Britannia and Plaines Wilhems Experimental Station but did not cause any reduction in yield in the Ferney trial. This may have been due to two causes:—
 - (1) Foodcrops were planted at approximately the same time in the first two trials and their quick growth might have, from the very beginning, obstructed the growth of the sugarcane plants. It appeared, in fact, that in these trials the young canes had to strive hard to ameliorate their light conditions. In the Ferney trial the foodcrops were planted one month after the canes had been planted. This gave a good start to the sugarcane plantation for at the time when the foodcrops were planted the cane setts had already established a fair amount of vigorous shoots.
 - (2) The trials, in which a reduction in cane yield was obtained, are situated in the localities where growth is much slower when compared to a locality such as Ferney. It might then be possible that the canes had not sufficient time to recover from the bad effects of the competition they had to face at the beginning of their growth.
- (b) Potatoes did not affect the yield of cane and this might have been expected when one considers the root system of that plant and its habit of growth.
- (c) Eddoes also did not affect cane yield even when planted in every interline. This is an interesting information as this crop is frequently interplanted with canes in the wet localities.
- (d) The detrimental effect of sweet potatoes might be due to the causes stated at (a).
- (e) It is not possible at this stage of experimentation to analyse the economic aspect of this interplanting effect ; more data are of utmost importance before any clear cut idea can be made in that direction.

Field Trials on Secondary Crops

Linseed. The experiments that were laid down this year aimed at obtaining further data on the growth of this crop under conditions prevailing in Mauritius. Fertilizer, Variety and Time of Planting and Planting Distance trials were conducted at Réduit and Plaines Wilhems Experimental Stations. The results obtained during the year under review are given below under the respective heading of each trial.

Variety and Time of Planting Trial

A trial was laid down at Plaines Wilhems Experimental Station this year on similar lines to that laid down the previous year at the same station. Unfortunately the trial was ruined through an abnormal rainfall in June and a severe attack of Anthracnose disease at a later stage.

Planting Distance Trials

Two experiments were laid down, one at Réduit and the other at the Plaines Wilhems Experimental Station. In both of these trials seeds of the varieties Rio and Punjab were planted in drills at 6, 8 and 10 inches apart.

(a) *Plaines Wilhems Experimental Station Trial.* The plantation was started in late June. The plants suffered at the beginning from rain but improved later on and a fairly good stand was established. The results obtained showed the following data:—

TABLE I

Planting Distance	Yield in grams per plot
Drills 6 inches apart	519
Drills 8 inches apart	527
Drills 10 inches apart	438
Significant difference ($P = 0.05$)	± 127

TABLE II

Varieties	Yield in grams per plot
Rio	430
Punjab	558
Significant difference ($P = 0.5$)	± 180

(b) *Réduit Trial.* The trial was planted at the beginning of July. The seeds germinated well and a fair stand was obtained. A spell of drought was experienced in September and the plants had to be watered occasionally during that month.

The results obtained are given below:—

TABLE III

Planting Distance	Yield in grams per plot
Drills 6 inches apart... ..	673
Drills 8 inches apart... ..	622
Drills 10 inches apart... ..	673
Significant difference ($P = 0.05$)	± 93

TABLE IV

Variety	Yield in grams per plot
Rio	687
Punjab	625
Significant difference ($P = 0.05$)	± 131

Fertilizer Trial

A $2N \times 2P \times 2K$ factorial experiment was laid down at Plaines Wilhems Experimental Station with a view to obtaining further information on the fertilizer requirements of this crop. The trial was planted in early June but unfortunately was completely ruined through the high abnormal rainfall, that occurred during this month in that locality.

Conclusion

The abnormally high rainfall experienced at Plaines Wilhems Experimental Station was the cause that no great success was achieved in the investigations carried out on that crop this year. So as to give an idea of what was the rainfall in that locality during the months of April to July, the following figures are given below:—

Monthly rainfall	Rainfall in inches			
	April	May	June	July
Average for years				
1943 to 1948 ...	14.63	3.96	4.41	6.54
Year 1949 ...	12.51	5.20	18.91	6.84

From the results obtained, however, some general observations may be drawn:—

- (1) The first thing that emerged from the variety-and-time of planting trials established in 1948 and 1949, is that linseed might grow well in a cool climate as that of Hermitage provided no heavy rainfall be experienced in the winter time.
- (2) The planting distance trials established at Réduit and Hermitage showed no significant increase in yield when seeds are planted in drills spaced at either six, eight or ten inches apart. Rio and Punjab were also found to be equally good in their yielding capacity in both trials.
- (3) The oil content of these four varieties taken on an average of three determinations, shows the following figures:—

		Oil percentage
Royal	...	46.6
Punjab	...	40.3
Rio	...	36.7
Local	...	35.7

It is interesting to note that Punjab which seems to grow well locally is superior to the local variety in its oil content. It is unfortunate that seeds of Royal were low in viability when received and so no good stand of this variety was obtained in the trials laid down. Seeds of good quality were secured this year from a multiplication plot laid down at Hermitage and trials to be made in 1950 may give interesting results as far as this variety is concerned.

Oats—Rice—Sweet Potatoes

Experiments in the form $2N \times 2P \times 2K$ were conducted this year on these foodcrops at the Plaines Wilhems Experimental Station. As the same layout was observed in these trials, for convenience, the results obtained have been grouped together.

Fertilization

				Fertilizers in Kgs. per arpent		
Foodcrops				Nitrogen at levels	Phosphate at levels	Potash at levels
Oats	...	...	...	nil and 50	nil and 200	nil and 100
Rice	...	...	...	nil and 50	nil and 200	nil and 90
Sweet potatoes	...	...	...	nil and 50	nil and 200	nil and 50

The nitrogen, phosphate and potash were given under the form of sulphate of ammonia, phosphatic guano and muriate of potash.

Growth

Oats. The trial was planted at the beginning of June. Apart from a constant watch that had to be kept against birds' attacks during the seeding stage, the trial showed good growth.

Rice. The trial was planted at mid-January. It showed good growth until the flowering stage was reached. At that time it was observed that a certain number of empty spikelets occurred which were found to be white and papery in appearance.

The Plant Pathologist visited the field and after examination of the plants came to the conclusion that this was probably a case of what is known as "Sterility in Rice." This condition has been attributed generally to either unfavourable weather conditions or to another degeneration. However, the presence of that physiological disease, as it may be called, occurred indifferently in all the plots and so did not affect the trial as a whole. Apart from that, the trial made fair growth.

Sweet potatoes. The trial laid down in February showed excellent growth throughout the growing period.

Harvest

The results obtained from these crops under the differential fertilizer treatments are given below:—

TABLE V

		Yield in kilogs per plot		
Treatments		Oats	Rice	Sweet Potatoes
O	...	1'14	0'70	16'5
N	...	1'43	0'88	22'5
P	...	1'56	1'10	18'0
K	...	1'31	1'00	22'5
NP	...	1'60	0'74	21'0
NK	...	1'48	1'23	18'0
PK	...	1'46	1'30	25'5
NPK	...	1'98	1'74	27'5
Significant difference. (P=0'05)		±0'87	±0'91	± 8'5

TABLE VI

		<i>Response in kgs. per plot</i>		
		<i>Oats</i>	<i>Rice</i>	<i>Sweet Potatoes</i>
Nitrogen	...	+ 0.25	+ 0.12	+ 1.6
Phosphate	...	+ 0.31	+ 0.27	+ 3.2
Potash...	...	+ 0.13	+ 0.46	+ 3.9

Conclusion

From the figures in Table V, it emerges that oats, rice and sweet potatoes responded to the complete fertilization, but while in rice and sweet potatoes the response reached significance, in oats it failed to do so by a narrow margin. Further, in sweet potatoes the treatment PK also gave a significant increase in yield.

From Table VI it may be observed that a very high response was obtained with phosphate for oats, whereas rice and sweet potatoes gave a better response with potash.

Groundnuts

A 3N × 3P × 3K factorial experiment was laid down at the end of February at the Plaines Wilhems Experimental Station with the variety Vigan Lupog. All combinations of nitrogen at levels of nil, 75 kgs. and 150 kgs. sulphate of ammonia per arpent; phosphate at levels of nil, 125 kgs. and 250 kgs. of phosphatic guano per arpent and potash at levels of nil, 75 kgs. and 150 kgs. of muriate of potash per arpent were used.

Growth was good throughout the growing period.

The results obtained showed the following data:—

					<i>Linear Response</i>
Nitrogen	...	...	...	...	+ 2.08
Phosphate	...	...	...	...	+ 0.24
Potash	...	...	...	...	+ 0.84
Significant difference (P=0.05)					± 0.90

From the above figures it may be observed that a significant positive linear response to nitrogen was obtained. Although positive responses to phosphate and potash occurred, yet they failed to reach significance.

Sorghum

Multiplication plots were laid down at Réduit and at the Tobacco Research Station with the seeds obtained from last year's trials. The varieties that grew best were Turkey No. 19, Bonita, Midland, Plainsman and D. D. Sooner. The main difficulty that arose was the bagging of the inflorescence at the seeding stage so as to protect them against birds' attacks. Seeds were collected from all the varieties for further trial.

E. ROCHECOUSTE,

Acting Botanist.

PART IV—EXTENSION SERVICE DIVISION

Staff

Early in January the appointment of three new field demonstrators, Messrs. D. Reetoo, J. B. de Gersigny and B. Roy brought the staff of the service to its full strength.

During the first two months of the year, a training course, comprising lectures and practical demonstrations, was arranged for the field demonstrators in order to make them more conversant with the various problems connected with sugarcane. A tribute must be paid to the heads of division and to the officers of the Department who very willingly accepted to deliver lectures to the field demonstrators.

At the close of the training course the different factory areas were allocated to the six field demonstrators as indicated below:—

- (1) Mr. J. Marot: Trianon, Highlands, Réunion and Médine factory areas.
- (2) Mr. G. Avice: Bel ombre, St. Félix, Union (Ducray), Bénarès, Savannah and Britannia factory areas.
- (3) Mr. M. Sooltangos: Rose Belle, Riche en Eau, Savinia, Mon Trésor, Beau Vallon and Ferney factory areas.
- (4) Mr. D. Reetoo: Mon Désert, Union (Flacq) and Sans Souci factory areas.
- (5) Mr. B. Roy: Beau Champ, Queen Victoria, Constance, The Mount and Mon Loisir factory areas.
- (6) Mr. J. B. de Gersigny: St. Antoine, Labourdonnais, Belle Vue, Beau Plan and Solitude factory areas.

Policy

The same general policy as last year has been adopted, but it has been possible to contact a much larger number of planters, either in the field or during meetings due to a larger staff.

During the year under review, sixty-eight meetings of small planters have been organised throughout the island; presidents and secretaries of Co-operative Credit Societies have again proved very helpful in this connection. All the usual problems met with by small planters were discussed during these meetings, stress being laid on the use of good planting material, proper planting period, the necessity to replenish the store of plant nutrients in the soil, regular weeding, etc.

Whenever possible, the lectures were accompanied by simple demonstrations. These meetings also afforded the opportunity to correct many erroneous ideas about the control and distribution of artificial fertilizers.

As a result of the activities of the Service, a fair number of small planters is now treating their cane cuttings with Aretan and using Phosphatic Guano at planting. A large proportion of the planters cultivating over ten arpents of cane is also using their maximum allocation of nitrogenous and potassic fertilizers, but comparatively few of the smaller ones are doing so. The main reason for this is financial embarrassment but other important reasons are:—

- (a) the distribution of artificial fertilizers at intervals ; and
- (b) the restriction imposed by law on the transport of same.

An improvement of these conditions would certainly have a favourable influence on small planters' yields. In two cases, however, it has been possible to help the small planters in overcoming these difficulties by obtaining from the millers that their artificial fertilizers, including Guano Phosphaté, be bought by the estate and delivered direct to planters in the factory yard. In one case, the estate manager has even offered to deliver to the planters of his factory area, in advance from his own stock, their total expected allocation of nitrogenous and potassic fertilizers. It is hoped that in future similar facilities will be obtained for small planters of other factory areas where the procedure does not exist already.

A closer co-operation between planters and millers will undoubtedly be a very useful step for the benefit of both parties and, in that connection, the Service might prove a useful link.

Phosphatic Guano

In July last, during regular field inspections, a field demonstrator was struck by the doubtful appearance of the Phosphatic Guano being used by a small planter ; a sample of this Guano, analysed by the Chemist of the Department of Agriculture, revealed only traces of phosphoric acid. Out of twenty-five samples of phosphatic guano taken shortly afterwards from small planters' stocks in various districts, four only contained twenty-five per cent of Phosphoric acid, while the others contained from traces up to eight per cent of Phosphoric acid. A special report on the matter was submitted to the Director of Agriculture and, as a result, Government Notice No. 289 of 1949 was issued fixing at twenty-five per cent the minimum phosphoric acid content of phosphatic guano. This has also been the starting point of new regulations governing the sale of nitrogenous and potassic fertilizers.

Intensive propaganda is being made in order to guard small planters against unscrupulous traders. Samples are being taken in the field in order to find out if there is an improvement in the situation.

Demonstration Plots

1. ARTIFICIAL FERTILIZERS

Only twenty-two demonstration plots could be harvested and weighed during the crop ; twenty-five others had to be discarded because the land owners had either applied additional fertilizers to the plots, or harvested the canes without notifying the field demonstrator concerned. Half of the plots harvested gave conclusive results. Planters of the different localities had

been convened in the field, before harvest, in order to observe personally the effects of balanced fertilization, the field demonstrator in charge giving all necessary explanations. The eleven other plots gave erratic results, as surmised, and in confirmation of the writer's view that the selected fields were unsuitable for laying down demonstration plots. Special attention is now being paid to this factor. It must be pointed out that it is surprisingly difficult to obtain from small planters suitable portions of land for demonstration plots.

Twenty-three new demonstration plots with artificial fertilizers have been established during the year.

2. CULTURAL OPERATIONS

In one factory area where the yields of small planters are abnormally low, the estate manager has spontaneously accepted to co-operate with the Service and to lay down two demonstration plots, one on waste land and another on a field of old ratoons. The agreements are:—

- (a) the estate will clear or uproot about one arpent of a small planter's field selected by the Service and will perform all the routine operations of the estate for planting its own fields, including removal of rocks and ploughing by machine ;
- (b) the estate will provide planting material, fertilizers, manure, etc., and will cultivate the field until harvest ;
- (c) the land owner will dispose of the ratoon field immediately after harvest.

An account of all the expenses incurred by the estate will be kept at the disposal of the land owner and an officer of the Service for checking purposes. These expenses will be recovered by the estate from the proceeds of the virgin crop, any surplus remaining for the landowner. If, however, the proceeds do not cover the expenses, no further claim will be made by the estate.

The object of this demonstration plot is to prove to the small planters of the locality that their cane yields can be appreciably increased by proper cultivation. Further, the estate manager would be prepared to extend to these planters all the assistance possible if they are willing to improve their cultural methods.

One of the fields has already been selected and both parties have agreed to start work early in 1950.

3. WEED KILLERS

The control of weeds by means of chemicals has been adopted by very few small planters up to now ; most of them are still unaware of this new development.

Twenty-one demonstrations have been made during the year using Methoxone, Fernoxone and Sodium chlorate according to the type of weed to be eradicated. These demonstrations have been very conclusive and have

invariably roused the interest of the small planters. The Service being only organised for demonstration purposes, the actual assistance that it has been possible to give to planters in this connection has been limited. A notable progress would be achieved if proper equipment could be put at the disposal of planters by the Service or by Co-operative Credit Societies.

4. CANE VARIETIES

All the plots harvested last year and containing the varieties M.165/38, M.63/39 and M.76/39 have been discarded on account of the restrictions to which these varieties are subject.

No new varieties being available yet, no new demonstration plots have been planted last season.

Other Activities

1. FACILITIES AFFORDED TO SMALL PLANTERS

Small planters having experienced great difficulty in obtaining Aretan and chemical weed killers in small quantities on the market, the Service has made arrangements whereby these substances can be supplied to planters in small quantities at cost price. Whenever requested, the field demonstrators delivered them locally, at the satisfaction of the planters.

2. PROHIBITED SUGARCANE VARIETIES GROWN BY SMALL PLANTERS

The field demonstrators of the localities concerned have found that prohibited Uba seedlings and Coimbatore cane varieties are still being grown on a large scale in the poorer regions of Moka, Plaines Wilhems and Grand Port. After personal inspection, the writer reported the fact to the Registrar, Central Board and to the parties concerned.

3. INTRODUCTION OF PESTS AND DISEASES

The field demonstrator in charge of Grand Port district devotes one day a week to the inspection of sugarcane plantations in the vicinity of Plaisance airfield. It is hoped that, by this measure, any accidental introduction of new pests and diseases, due to the frequent arrival of air planes, might be detected and dealt with within the shortest possible delay.

4. FOLIAR DIAGNOSIS

Comparatively few leaf samples were taken this year from small planters' fields. The results obtained from foliar diagnosis last year have given a sufficiently clear picture of the mineral status of small planters' lands. The small planters are therefore urged to make use of their maximum allocation of artificial fertilizers under control as well as of Phosphatic Guano.

The Sugar Industry Reserve Fund Laboratory has not, as yet, completed the analysis of the leaf samples taken this year.

5. SUGARCANE ANALYSES

The analysis of all sugarcane samples collected during the crop by the different divisions of the Sugarcane Research Station, was carried out by Mr. Sooltongos ; during this period the activities of this officer, as field demonstrator, had to be reduced accordingly.

The field demonstrators have given assistance to other divisions of the Sugarcane Research Station whenever necessary ; the inverse has also been true.

Up to the end of November, when Mr. P. R. Hermelin was appointed as Assistant Plant Breeder, the writer helped the Plant Breeder in the discharge of his duties.

Preliminary trials have been made, in co-operation with Mr. A. d'Emmerez, the Food Production Officer, in order to test the suitability of a light " Garner " motor tractor, received by the Department of Agriculture, for the cultivation of food crops. The machine as well as all the implements supplied therewith have proved too light and weak for normal work under local conditions. Even for light weeding, the implements should be much sturdier.

Conclusion

The achievements during the year, although fairly appreciable, may be considered as a mere step in the improvement of the cane yields of small planters, which is the aim of the Service. Full success has not been achieved yet, and progress on all lines is still to be made.

G. MAZERY,
Senior Field Demonstrator.